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Magnetic Separation at Galena, Illinois.

STAFF CORRESPONDENCE.

The Joplin Separating Company has two works, one at Joplin, Mo., the other at Galena, Ill. The company is a purchaser of low-grade zinc ore, which is concentrated on jigs and tables and then roasted and separated on Cleveland-Knowles magnetic separators. The plant at Galena, Ill., is described in this article. It is run under the management of W. P. Cleveland, one of the patentees of the Cleveland-Knowles separator.

The crude ore is wheeled in barrows to a grizzly having 1¼-in. spaces. The oversize is broken by sledging while the undersize, with water which is added at the beginning, goes to a 10-in. bucket elevator, delivering to a trommel covered with a perforated screen having ¼-in. openings. The oversize goes to a pair of 24-in. rolls and is re-crushed and returned to the elevator. The undersize from the ¼-in. screen goes to an impact screen, upon which at present is being used 20-mesh wire-cloth, but the intention is to use 30-mesh in the future.

The undersize from the impact screen goes to two Wilfley tables, on each of which galena, lead pyrites and blende are separated. A clean galena product is made, but only a rough separation of the pyrites from the blende can be effected. The oversize from the impact screen goes to a seven-compartment jig having 30x36-in. screens. The sizes of the screens in this jig, beginning at the lead end, are as follows: No. 1, 5 mesh; No. 2, 8 mesh; No. 3, 4 mesh; No. 4, 5 mesh; No. 5, 6 mesh; No. 6, 7 mesh; No. 7, 8 mesh. The tails flow directly to the creek, while a clean lead concentrate is made on the first two cells, and a mixed pyrites-blende concentrate comes from the other five. These concentrates are wheeled in barrows to bins, where the moisture is allowed to drain off.

The concentrates are later wheeled to the roaster elevator, by which they are raised to a hopper holding four tons. This hopper feeds into a galena roaster, which has a capacity of 40 tons in 24 hours. The cylinder is 32.5 ft. long and 5 ft. in diameter. The ore remains from 2½ to 3 hours in the cylinder, from the lower end of which it falls into the iron trough of a scraper conveyor. The roasting is controlled so as to burn off one atom of the sulphur of the pyrites. Under-roasting and over-roasting are both bad. Over-roasting is manifested by the ore being too red and slightly sticky, which causes the finer particles of iron to envelop particles of zinc sulphide, thereby leading to a loss of zinc in the middling product. To guard against over-roasting the policy is to regulate the roast so that the ore when discharged has just a slight blue flame, showing that the last traces of easily burned sulphur are being driven off.

The scraper conveyor delivers the ore to a barrow, by which it is wheeled to a cooling floor. The cooled ore is then wheeled to a belt elevator where it goes to two trommels, each installed over a bin holding 30 tons. The chute from the elevator is so arranged that it can be made to feed either one and, moreover, the product from either trommel can go to either bin. One of these trommels is fitted with a ⅛-in. perforated screen and also a ¼-in. screen. The other trommel has only a ⅛-in. screen. The oversize from these screens is sent to 10x12-in. rolls, and after being crushed is returned to the elevator again. The product from the ¼- and ⅛-in. screens is kept separate and each size is fed to a separator. The middling product coming from the second magnets is sent to 10x12-in. re-crushing rolls, and then is elevated to a screen having 3-mm. holes. The oversize goes back to the rolls again, while the undersize is sent to a third magnetic separator, the middlings from which are not treated any further. The concentrates go into 140-ton bins, whence they are loaded into small cars and trammed to the railroad cars when a shipment is to be made. The zinc product of the magnetic separator treating the middlings goes to a separate bin.

The power plant consists of two 80-h.p. Atlas boilers, of which only one is run at a time, a 10-h.p. upright engine, which runs a small dynamo giving a 40-ampere, 32-volt current, and a 50-h.p. engine, which runs the mill. Cutler-Hammer resistance boxes are used to regulate the amperage on the magnets. The voltage is kept at 90; the current used on the first or roughing magnets is two amperes, and that on the finishing magnet is 6.5 amperes.

Owing to the fact that the company cannot obtain as much ore as it could a year or so ago, when fewer mines were equipped with magnetic separators, the roaster is run only at night, a smoldering fire being kept up during the day. The concentrating plant is run day shift. The day force consists of foreman, feeder, jigman, tableman and engineer. Besides there are always two or three men wheeling in ore. The night shift consists of an engineer, fireman, feeder and wheeler. Because of the intermittent running of the roasters at this plant, and because of the low character of the ore treated, magnetic separation is being carried on under the worst possible conditions. Mr. Cleveland states that the efficiency of the magnetic separation is about 85 per cent. of the zinc content from carload tests that he has made.

The average of the concentrates made last year for 33 cars holding from 30 to 40 tons each and shipped to the Illinois Zinc Company was for the coarse (¼-in. size), 60.49 per cent. zinc, and 2.11 per cent. iron; for the fine (⅛-in. size), 57.07 per cent. zinc, and 2.19 per cent. iron. Taking one part of the coarse to two parts of the fine, which was approximately the relative proportions, the average was 58.21 per cent. zinc and 2.16 per cent. iron.

Various financial concerns are now exploring a cupriferous district in the French Congo, about 200 km. from the coast. J. Bel, an engineer, recently set out at the head of an exploring company organized by the Société Française pour l'Industrie et les Mines, of 45 Boulevard Haussmann, Paris.

"Oxyliquit" is a new explosive, which consists of liquid air mixed with oxidizable substances, especially wood charcoal. The bursting effect of mixtures containing hydrocarbons, etc., depends upon the heat of combustion of the combustible substances. Petroleum carbon and cork charcoal have been used in place of kieselguhr, as absorbing agents. The explosive acts well, but suffers from the disadvantage that its action is considerably diminished, especially in bore-holes of small diameter, by rapid evaporation of the liquid air. Liquid oxygen has recently been used in place of liquid air.

Leasing at Goldfield, Nevada.

BY CLAUDE T. RICE.

With the exception of the Combination mine, practically all the orebodies of Goldfield have been discovered by leasers. Not only does Goldfield owe its greatness to this system, but the money made by it has helped to develop not only Goldfield, but the other camps of Nevada, such as Bullfrog, Manhattan and Fairview, where Goldfield people are much interested. At Tonopah, most of the money produced from the mines goes to Eastern stockholders, but at Goldfield a large part of it stays to help on mining in the State. Consequently the leasing system at Goldfield has been indirectly the making of newer Nevada.

Although the first location at Goldfield was made in November, 1902, the camp did not begin to amount to much until rich ore was struck in the Patrick lease on the January claim. True, the Combination was a fairly good mine, and some good ore has been found on the Jumbo, but interest had begun to wane; people had commenced to think that, possibly, Goldfield was a one-mine camp. After having prospected four or five days to find the source of the rich float occurring at the surface, on Jan. 10, 1904, the leasers caught the pay ore about 15 to 18 in. below the surface. Unlike later leases, this first one took in the whole January claim. The vein was worked to a depth of 280 ft. at one point. The ore went from $150 to $2000 per ton, and in some places it was stoped for a width of 11 to 12 ft. This lease ended January 5, 1905, and was the first successful lease in the camp. Seventy men worked in the lease most of the time.

Soon after the January lease struck ore, rich ore was found at grass roots on the original Florence lease, which had the block of ground where is shaft No. 1 of the Florence. This lease produced $750,000 during its year of existence, which ended January 15, 1905. The ground was worked for a depth of 200 ft. and for about 100 ft. along the vein. Several fortunes were founded by this lease. A royalty of 25 per cent. was paid on the rich ore.

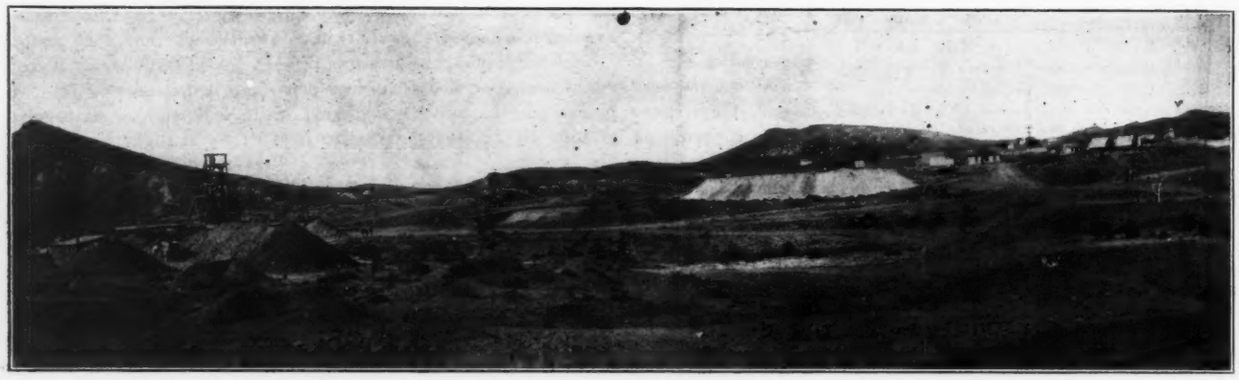
Soon afterward, the leases on the Jumbo struck rich ore. Blocks the width of the claim and 100 ft. along the vein were let at the Jumbo, and a royalty of 20 per cent. was paid. The Bowes & Kermick was the most successful of these leases. It was on the block of ground where at present the Jumbo hoist it located. This lease was worked to a depth of 200 ft. and employed over 100 men a day by far the greater part of its life. The ore started at the grass roots and about $500,000 was produced during the life of the lease. The Zinn lease produced about $150,000 from its 100 ft. of ground, while the Ridge & Curtis lease produced $130,000. All told, the Jumbo leases produced $900,000 in a little over five months' time. The bulk of this came from above 50 ft. in depth.

About the same time the Sandstorm leases began to pay. Considerable work had been done on the Sandstorm and the Kendall claims by a party of leasers, but they failed to know ore when they had it. If the first leasers had panned the dirt where they started their shaft, they would have found shipping ore. Later the dump around this shaft was moved and the surface dirt shipped by the company.

The Loftus, Davis & Mayne lease on Block 5 of the Sandstorm lasted 21 months, ending Jan. 1, 1906. The Mayne & MacDonald lease on Block 6 ran a year and struck ore only during the last two months; for two months previous work had been done in close proximity to the ore without finding it; one drift was only 2 ft. below a rich pocket. Block No. 6 was worked with a windlass to a depth of only 50 ft., but it produced $100,000 in the last two months of its life. Block No. 5 struck ore at the surface and produced some of the richest ore in the camp, yielding a total of about $250,000. Later, in the fall of 1904, the Oddie & Gardner lease on the Kendall found ore and shipped the richest carload of ore going from Goldfield. This carload of 16 tons netted $60,000 above shipment and smelting charges. The Sandstorm and Kendall leases were 500 ft. wide by 150 ft. along the vein.

Last year the Reilly lease on Florence No. 2 attracted wide attention. This lease during its life has produced $550,000, all from ore averaging over $100 a ton. It employed 60 to 70 men and the vein was worked to a depth of 200 ft.

This year the leasing center has been transferred farther west to Mohawk and Combination ground. Hayes and Mon-



PANORAMA OF LEASES ON COMBINATION AND MOHAWK CLAIMS.

ODDIE-MOHAWK LEASE, MAY 31, 1906.

nette had done considerable work upon their Mohawk lease. They had drifted for quite a way on the 80-ft. level without finding any rich ore and were becoming discouraged. Fortunately about this time, Feb. 1, 1906, Sheets and Ish, who had just taken a lease, 300 ft. square, on the northeast corner of the Combination claims, struck rich ore at a depth of 40 ft. This encouraged Hayes and Monnette and finally, April 12, they struck rich ore on the 150-ft. level in their mine. This orebody, average width of 23 ft., a large part of which is shipping ore.

The leases at Goldfield run either for six months or a year and are let upon blocks of ground sometimes only 300 ft. wide, at other times the whole width of the claim. The leaser has to confine his workings within vertical planes, i.e., there are not extra-lateral rights. The royalty paid is generally 25 per cent. on shipping ore, i.e., above $50 value per ton, and 20 per cent. on milling ore, i.e., below $50 a ton. All ore hoisted to surface before expiration of the lease belongs to the leaser, but all broken ore remaining in the stopes belongs to the company. Any milling ore on the dump can be left there for six months; but if the leaser has not had the ore milled by then the company can have the ore treated, and after paying the treatment charges and taking out the royalty turn over the balance to the leaser. All royalty charges are taken out of the ore after the treatment and transportation charges are paid. In these leases the size of the shaft is specified, and generally it is required to be 4x8 ft. in the clear. The shaft must be timbered by the leaser if that is necessary. All drifts are also specified to be at least 4x6 ft. in the clear. Underhand stoping is prohibited, except that all surface discoveries can be worked to a sufficient depth to determine the dip, pitch. etc., and so enable the shaft to be sunk at the most desirable point. The size of the shaft pillar is also specified. All mining must be done in a miner-like fashion. The number of shifts required to be worked each month (generally 60) is also specified. This amount of work must be done each month "unless prevented by labor, or extraordinary mining casualty," and all miners and laborers must be paid the customary wages. Levels closer than 50 ft. apart vertically are usually prohibited. Monthly statements are required and in case of failure on the part of leaser to pay bills promptly the lease becomes forfeited. Unnecessary mixing of low-grade ore with high-grade ore so as to reduce the royalty paid is forbidden. All improvements below the collar of the shaft required in working the lease become the property of the company at the expiration of the lease.

PANORAMA OF LEASES ON COMBINATION AND MOHAWK CLAIMS.

composed of fine-grained sulphides, has been proved to be the largest body of shipping ore in Goldfield. In fact, it is so large that owing to the comparatively small amount of development done upon this vein, only a surmise of its size can be made. Up to June 1, it had produced 5000 tons of ore averaging $80 per ton. Since then the leasers have been employing 75 men and shipping about 120 tons a day.

ODDIE-MOHAWK LEASE, JUNE 16, 1906.

The Sheets & Ish lease has an orebody which almost rivals the Hayes & Monnette. On this lease the shaft is down 150 ft., with levels opened at 60 ft., 110 ft., and 150 ft. The orebody has just been cut at the 150 ft., but no shipping ore has been found as yet. The orebody runs north and south and dips 30 deg. to the east. It has been opened up on the 110-ft. and 60-ft. levels for about 200 ft. along its strike. The vein is said to have an

Leasing begins on a small scale but almost always with three shifts. A windlass is used at first, then later a whim or whip is installed. The whim or whip frame consists of a tripod, the sheave of which is 12 to 14 ft. above the collar of the shaft. Sometimes a whim having a wooden drum made by a local blacksmith is used, but generally a geared whim is used. With this equipment, work proceeds until ore is struck. Of course if much drifting is done, artificial ventilation is necessary. This is done at first by means of the old wind sail, as will be seen in many of the illustrations; later, fans are installed. The ore is hoisted in buckets and dumped either into a car or the loaded bucket is detached and run on a truck to the dump. A still better way than this last is shown in one of the illustrations where the bucket is lowered into a swinging cradle placed on a truck. Two hooks hold the bucket in place while being dumped. Near Diamondfield on one lease the hoisting was done down to 100 ft. in depth by wrapping the rope several times around the drum of a windlass and then attaching the rope to a whip-horse. Instead of lowering by fastening the rope to the horse's collar, as is generally done in

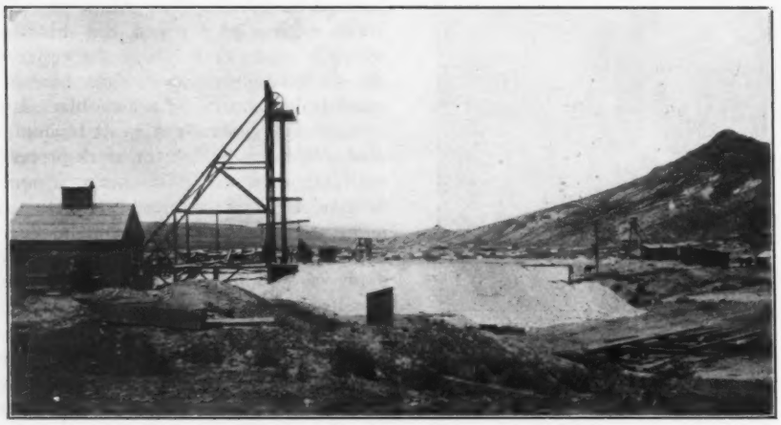
whip hoisting, the bucket could be lowered by means of the windlass brake strap. This also avoided installing a whip frame. It is a curious but crude method and not to be recommended.

Work is vigorously prosecuted until either ore is struck or the funds or nerve of the leaser fail. As soon as ore is struck a lease becomes one of the busiest propositions imaginable. Every minute lost means money out of the leaser's pocket. Work is vigorously prosecuted by means of the whim, while a gasolene hoist and small gallows frame is being installed. Bins are erected; probably a fan is put in. If the orebody is very large the shaft may be enlarged and retimbered, provided the lease still has a long time to run. On the Oddie lease a cage and car is to be used. In another case a self-dumping skip was used; but in general all hoisting on leases is done with buckets. Everything is driven ahead with three shifts.

Many leases have produced over a thousand dollars a day after ore has been struck, some even ten thousand. With this incentive almost incredible transformations take place in a few days, as is shown by the accompanying pictures of the same properties taken at different periods.

The ore is gouged out as fast as possible; in large orebodies occasional pillars are left, but rarely is any timbering done in the stopes. Although a clause in the lease demands miner-like work, nevertheless a mine in its upper parts is generally a mess when the leasers get through. However, it is the policy of the Goldfield companies to have leasers develop their properties and, with all its drawbacks, it seems the best way when rich pockety ores occur. The leaser generally has a "fine nose" for ore, but, nevertheless, many rich bodies of ore have been missed by leasers. Some leasers have missed the rich pockets because they failed to pan every foot of the development. They cast aside rock, which they did not like, without testing it. But leasers have learned their lesson and the companies have learned it from the leasers. Gold is where you find it, at least in New Nevada; any kind of rock may be ore, and rich ore at that. Leasers have worked to a depth of 250 ft. in Goldfield, and some leases have become large enough to call respectable mines, for many have employed over 70 men a day and some over 100 men. Certainly the leasers have been the making of Goldfield.

BUCKET DUMPING TRUCK.



MACKENZIE NO. 1 LEASE, MOHAWK CLAIM.

Internal Strains in Iron and Steel.*

BY HENRY D. HIBBARD.

Internal strains in iron and steel may be divided into two classes, according to the causes which produce them: 1. Those caused by an irregular rate of change in temperature, i.e., of heating or cooling. 2. Those caused by cold working or permanent change of shape of the piece under consideration by mechanical means at atmospheric temperatures, or at least at temperatures below that at which the metal is softened.

Internal strains due to irregular heating or cooling are by far the more important of the two classes. Because iron expands when heated and contracts when cooled, and indirectly for other reasons, internal strains, varying in all degrees from harmless to fatal, exist in all pieces of iron and steel. This arises from the fact that all commercial iron and steel is the product of processes involving heat, the strains in most cases being those set up by the more or less irregular rate of cooling. The amount of change in temperature does not affect the strains produced. The rate determines all.

The strains due to irregular cooling, unless chemical changes are involved, are apparently between part and part. Those due to cold working may be considered as between molecule and molecule because of the disarrangement of the molecular formation. The latter results usually in strains betwen the parts as well. Strains which come under this division of the subject should be considered under two aspects: 1. Those which arise during the continuance of the causes which produce them—that is, temporary strains. 2. Those which remain after their causes have ceased to act—that is, permanent strains. Temporary strains in many cases become permanent, especially when set up during cooling at an irregular rate. The phenomena of permanent strains are, during their formation, the same as of temporary strains.

The following cases will illustrate the two ways in which each kind of strain may result in rupture of the piece. When an ingot of hard steel is placed in a red hot furnace, and is so ruptured internally by the faster expansion of the interior, due to the rapid heating it undergoes, that it separates into pieces when forged or rolled, its ruin was caused by strains occurring while the cause, namely, the quick heating, was in operation. This is a typical example of temporary strains in steel. When a boiler plate of soft steel, lying cold on the floor of the shop, cracks suddenly it is because of strains existing after their cause had ceased its action. This is the usual kind of internal strains occurring in iron and steel, and is the kind chiefly meant in what follows in this part; it is an example of permanent strain. These two instances cited are, it will be understood, extreme cases, in which the piece is ruptured by the intensity of the strains. Strictly speaking, permanent strains are but relatively permanent, since they decrease when the piece is again heated, or through the seasoning or annealing action of time. When strains result in rupture of the piece of metal they are thereby much reduced in amount and otherwise modified.

*Excerpt from a paper read at the London meeting of the American Institute of Mining Engineers, July, 1906.

The entire supply of monazite in commercial quantities comes from river and beach gravels; crystalline masses of monazite, in their original rock, have been found in Queensland.

Quartz Mining in Colombia.

BY F. F. SHARPLESS.*

Quartz mining in Antioquia is comparatively an infant industry. True, we know that some operations have been conducted on quartz veins for almost a century, but the works cannot be called extensive, and they have yielded only a small percentage of the total production of the country. The placers, as a rule, have not been derived from workable quartz veins; hence the operations on the former have not led to the discovery of the latter. In fact, so far as my observations went, I saw very little placer mining in those localities where I found workable gold quartz veins.

I infer that the veins have not received more attention because of the fact that as a rule they are not very rich. Occasional bonanzas have been found, but they are not of frequent occurrence. Many of the little Cornish mills (*molinos Colombianos* they are called) have been worked at a profit, but not with such profit as to produce booms or attract much foreign capital.

Among the districts best known in the department are Sonson, Anori, Amalfi, Remedios, Santa Rosa, Zancudo and Marmato. During my investigations I visited all of these and many others, all of which are of interest to the mining engineer. In all of the districts named there are working now, or have been worked, mines of considerable importance, and while the engineer will seldom see anything new in the way of mining or milling operations, he will see how we mined and milled in the States two or three generations ago. He will also see ore deposits that could be worked by our present-day methods, and he will wonder for a time why they have not been adopted. His first answer to his own question will be "evident lack of enterprise on the part of owners." This is rather a hasty conclusion to draw, for while there seems to be a lack of enterprise, there are reasons for the state of affairs.

When you have seen one Colombian mill, you have seen all that there is to be seen about the native milling operations (there are certain exceptions to this, but I write of one's general observations).

In 1828 a Cornishman erected a wooden stamp mill with iron shoes, and provided a mortar with a rock bottom. That mill has been the father of a very large family, generations of which are yet to be born. The mill is built in multiples of three, four, five or six stamps to the battery, with seldom more than 12 stamps in any mill. Motive power is furnished by overshot water wheels and mountain streams that are almost always to be found close at hand of at least sufficient power to run the small mills. The ore as it comes from the mine is dumped at the back of the stamps; sometimes the larger pieces are broken; more frequently the ore is fed to the batteries just as it comes from the mines, at intervals suiting the mill man, who performs all the duties pertaining to this portion of the plant. The crushed pulp passes through a board punched with nail holes, the size of the hole depending upon the size of the nail that was at hand when the mill was built. The pulp passes over blankets or gunny sacks, which are washed in a tank whenever the collection of sulphurets requires it. No amalgamation is attempted. The concentrates are generally washed in a *batea* to remove any gold that has been liberated; they are then ground in an *arrastra*, and re-concentrated on planks that have been roughened by cross-scoring. The material clinging to the planks is collected and again washed for free gold in the *batea*. In a very few cases the tailings from this last operation are dried, sacked and exported, but more frequently they are allowed to rust preparatory to another grinding in the *arrastra*. The work done by many of the *batea* men and women in the separation of gold from the sulpherets is little short of marvelous, exceeding in rapidity and completeness any work of this character that I have observed in other parts of the world. Taking about 5 lb. of the reground sulphurets, washing on the *batea* is begun under water. As the settling of the gold proceeds, it is brought more and more frequently to the surface until finally the *batea* is held entirely above the water where the operation is finished, resulting in less than 10 minutes in a heading of a fraction of an ounce of almost clean gold, and a tailing from which it

WOMEN TRAMMERS.

ON THE TRAIL TO REMEDIOS.

*Consulting mining engineer, 32 Broadway, New York City.

would bother an American to pan a single color.

This mill and process have been eminently suited to the needs of the small operator, and have been a success where a modern California mill would probably have spelled ruin to its owner. In the first place, the small operator is never a man of much means. With $100 in hand he can buy food for the carpenters while they are converting the forest trees into material for a mill and erecting it. When the mill is completed it is put into operation, the carpenters become miners, and if there is any gold in the ore the mill soon pays off the small amount of its indebtedness. If no gold is recovered the men are out their time, but are not so discouraged but that they will soon start on another mill near some more promising cropping.

Nature provides practically everything needed on the spot, with the exception of iron shoes. With $300 cash a 10-stamp mill, with a capacity of one to three tons per 24 hours, can be built and put in operation at almost any point in the hills of Antioquia. Though he will have but a small output, the operator eliminates the vexed questions of transportation over impassable trails and a heavy initial mortgage on his mill. In fact, if it were a case of putting up a more expensive mill, nine-tenths of the mills in Colombia would never have been built. Then, rather than criticize for lack of enterprise, we should admire the Yankee ingenuity with which the native has made use of the materials at hand to start his operations.

As operations have grown, as returns have been satisfactory, some properties have introduced more advanced ideas in their practice; but as a rule the first mill has been duplicated and reduplicated until as many as eight or ten mills with 5 to 20 stamps have each been built on a single property.

In some cases at least the properties have merited more modern treatment, and it is rather a pity that operators had not more faith in their properties. At Remedios the Frontino & Bolivia Company, an English organization, and a French company at Segovia, introduced modern California mills, while at Marmato a hybrid between the old Cornish mill and the California mill is now doing duty. Primarily the reason for using the old mills in the larger properties is their inaccessibility.

To get into Antioquia, one lands at the seaport at Savanilla, takes a railway to Bananquilla, then a flat-bottomed light-draft river steamer 300 to 500 miles up one of the largest rivers. Occasionally these rivers are very low, and transportation in anything but small canoes is impossible for weeks at a time.

When the upper river port is reached it is a question of getting material over long and bad trails. There are a few railroads in the country, and a few good trails which may be used in part; but I found no mine located, with the exception of those near Remedios, where they had good trails from the rivers to the mines. With a railway from the coast to some central point, as Medellin, making importation of machinery and exportation of concentrates possible at reasonable figures, there are many veins in Antioquia that could be worked at a very fair profit—veins that are now producing little or nothing. There are not enough of such veins to warrant the expense of building such a railway, but the country has other natural resources which would amply repay such an undertaking.

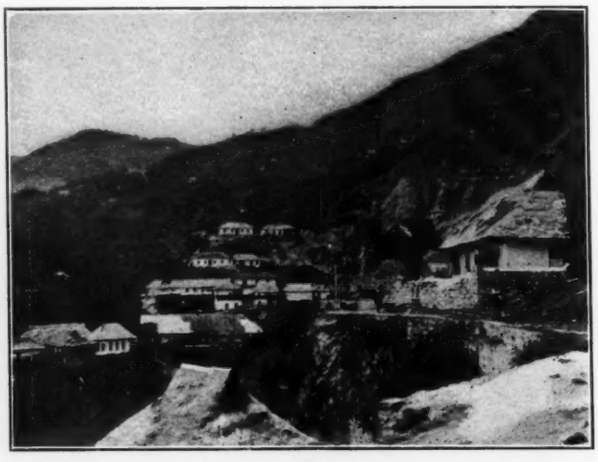
Railway building in Colombia will be expensive. In the low countries, where grades will be easy, much swampy, hot and ever moist country must be traversed. Experience has shown that a track in this kind of country is both expensive to build and to maintain. In the higher lands the railway must pass through a country of decomposed granites and syenites; the cuts and fills for many miles will be of clay. There are two rainy seasons with heavy precipitations, and engineers know what must be expected in order to maintain a road through such a country. Without the initiative that a railway cut inaugurates, land slides of thousands of tons occur at frequent intervals along the trails that are passed over today. More slides may be expected with a railway cut to start them.

When capital is satisfied that a competent and stable form of government has been inaugurated, it will begin to build railways in Colombia, in spite of the difficulties, just as it has done in Mexico and in the countries to the south of Colombia; and when that day comes capital may also be invested in Colombian mines to advantage.

At the present time, by far the greater part of the gold quartz mined is free milling, or, rather, the gold that is recovered is free; that in combination or finely disseminated through the sulphurets is lost. The Zancudo mine is the only property doing any smelting, but this is on a silver-gold ore and confines its work to the treatment of its own product. There are other points where smelters could be operated to advantage, were it not for the question of transportation. There are deposits of coking coal available for such smelters, there are fluxes and there is copper or lead for collecting the precious metals.

No lead or copper of any consequence has been developed because of the impossibility of using it, but galena and chalcopyrite are known to exist in slightly developed croppings, and they also frequently form a portion of the blanket concentrates from the little mills. One case came under my observation where operations were being conducted on several large irony veins, attempts being made to save only the free gold. About $2 per ton was saved, while $8 to $10 per ton was lost with the tailings. At almost any point in the United States, these ores, with natural conditions as they accompanied them in Colombia, could be smelted at a handsome profit. At this particular point the reason for not smelting was because of the expense of bringing in supplies and taking out the product.

TAILING CATCH PITS.



MARMATO MINES.

From Bananquilla to the nearest river port the freight varies from $8 to $15 per ton, depending upon the stage of water and the number of boats running. The freight for 40 miles over a railway is about $5 per ton. From the end of the railway to the mine, 150 miles, part of which is over a bad trail, the freight varies from $6 to over $20 per *carga*, depending upon the condition of trails, wet or dry, the amount of the coffee moving out of the country and the greater or less amount of merchandise to be moved from the end of the railway. A *carga* weighs about 250 lb., so that freight from Bananquilla might be brought in for $60 per ton, or it might cost double that, or if the pieces were heavy and could not be made up into an ordinary load, the transportation would cost still more.

The searcher for gold quartz veins will find them with greater or less development throughout the Department from the Remedios district at the north to the Marmato on the south, from the foothills on the east to the Frontino on the west. Within this territory the prospector will not find a good field; what is needed is capital to develop what has already been found, and the man who puts his capital into this Department will do well if he can use it at a point near where some future railway will be built.

The operator of quartz mines will not have to contend with the difficulties of the placer operator in respect to climate; at least his troubles due to sickness of employees will not amount to much. The greater number of the quartz veins that have been opened are well up in the hills, where the temperature is mild and fevers are seldom troublesome. There is much sickness all over the high lands, but it is due to diseases as easily avoided in Colombia as in the United States.

The people of the high lands are steady and better workmen than those of the river country. Although the miners have had no great amount of experience, they can be called fairly satisfactory, and will be found, under proper discipline, to do a good day's work.

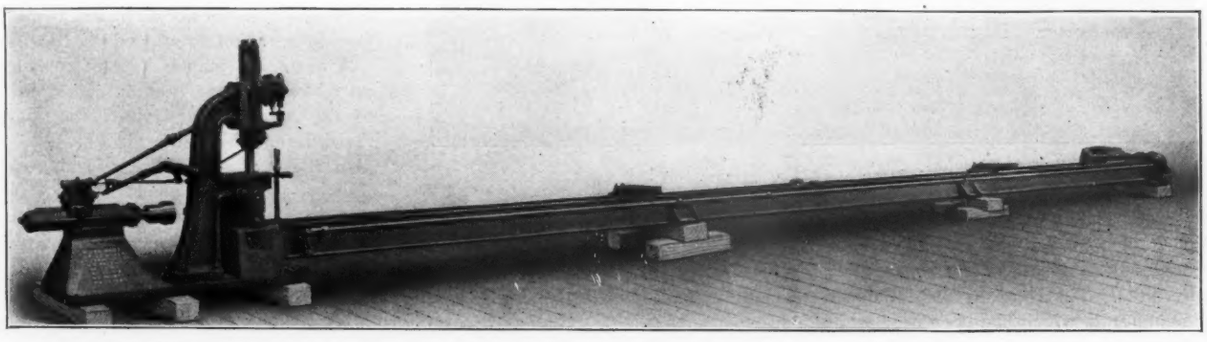
The more intellectual people with whom one comes in contact are of nearly pure Spanish extraction, and while differing in temperament from Anglo-Saxons, they are courteous, of high intelligence, and quite satisfactory to do business with.

Medellin, the center of business and population of Antioquia, is the second city of size in Colombia. Large wholesale and retail houses furnish all classes of ordinary supplies, the cost of which is sufficiently low, so that mining operations are not expensive, except when necessary to bring in heavy machinery and extraordinary supplies.

Gold quartz mining in Colombia is not dead, it is not dying, but it is in a comatose condition, only to be relieved by railroads and their accompanying development of the country.

The Word Drill Sharpener.

Word Bros., of 60 Castro street, San Francisco, Cal., have recently constructed a drill sharpening machine which is noteworthy because of its extraordinary size. It is illustrated in the accompanying engraving. The standard machine of this make is seldom required to handle drills larger than 3½ in. in diameter and 10 ft. long, but this special machine sharpens old drills, and forges new ones from steel bars, from 1¼ in. diameter to 5 in. diameter, and from 1 ft. to 30 ft. long, without any change of dies or appliances in the different sizes and lengths of drills. It also forges and sharpens flat or churn drills up to and including 30 ft. in length. The machine was designed for and furnished to the Isthmian Canal Commission, and will be used to handle the drill steel at the great Culebra cut on the Panama Canal.



WORD DRILL SHARPENER.

Many steel castings may not be allowed to cool in the open, or even in the sand, without danger of spontaneous rupture from internal strains, but must be placed while still hot in a heated receptacle, usually a furnace, and allowed to cool with the furnace at a much slower rate than if in the open air. Steel wheels, as well as iron car wheels, usually require such treatment, though the ductility of the softer grades may admit of its omission. On the other hand, the greater coefficient of expansion of steel tends to set up greater strains than those of the iron wheels.

Mineral Resources of Russian Central Asia.

Mr. Theiss, in a recent article in *Zeit fur Berg- Hutten- und Salinenwesen,* states that Russian Central Asia, which comprises all the countries situated between the Caspian Sea and Chinese Turkestan on the one hand and those between Persia and Siberia on the other, is very rich in salt marshes throughout the lower part near the Caspian Sea and Lake Aral, and many kinds of minerals in the mountains. Salt abounds in the Trans-Caspian province in the form of rock salt, and salt naturally deposited in the marshes and salt lakes. In some parts of this province considerable deposits of Glauber salt are found. The sodium chloride is extensively exploited, where the sulphate is hardly so, except by a few private persons. In this province there are also some petroleum wells, so far utilized only by the Trans-Caspian Railway. In the more mountainous province of Samarkand there are numerous coal, anthracite, lead, manganese, calamine, antimony, sulphur, graphite and turquoise mines. The province of Ferghana contains gold. All this mineral wealth, except salt, unfortunately remains unutilized for the main part. Many of the deposits are inaccessible, and those which are mined have only been so, in most cases, since construction of the Trans-Caspian railway.

Dr. C. J. Norwood, director of the State Geological Survey of Kentucky, has appropriated toward coöperative topographic work with the Federal survey $10,000 of the funds provided by the last legislature. The director of the United States Geological Survey has set aside for these Kentucky surveys an equal amount from the Government appropriations. These topographic surveys will cover portions of Wayne, Russell, Pulaski, McLean, Ohio, Muhlenberg, Union, Crittenden, Caldwell, Hopkins, Webster, Leslie, Perry, Knott, Wood, Fayette, Scott, Franklin, Henry, Owen, Spencer, and Washington counties.

The Utah Consolidated Mining Company.

STAFF CORRESPONDENCE.

This company was organized in 1896 to operate a large group of claims at the head of Carr fork of Bingham cañon, the principal claim of which was the Highland Boy. In the course of mining the gold ores occurring at the surface the underlying sulphide ores had been found in several places, but it was not until December, 1896, when the Highland Boy mine shipped 5000 tons of ore that the copper resources of Bingham cañon began to be appreciated. The company also equipped the stamp mill, which had been used while developing the oxidized gold ores, with a cyanide plant in order to increase the percentage of extraction of gold, which, by simple amalgamation, was gradually decreasing with the increase in depth and consequent increase in copper contents. This cyanide plant was run from September, 1897, until April, 1898; from 1000 to 2000 tons of ore, averaging about $6.50, were leached each month and a saving of 80 per cent. of the gold was made. Owing to the copper contents of the ore, however, the consumption of cyanide was very high and finally the process was abandoned, not being commercially successful. Some of the silicious gold capping is now mined from time to time and used for lining for the furnaces at the company's smelter. Since the abandoning of the cyanide treatment of the ore the company has confined itself to exploiting the copper ores.

HIGHLAND BOY MINE.

The Highland orebody occurs as large plum-shaped deposits of iron sulphide, carrying chalcopyrite and some bornite and chalcocite, in a limestone belt having a general east and west strike and dipping northward at from 25 to 55 deg. These orebodies occur as replacement deposits in the limestone, and appear to owe their origin to a series of nearly vertical fissures having a strike of N. 20 to 25 deg. E. These orebodies are steep in dip near the surface, but become flatter in depth, the dip averaging about 45 deg. toward the north. They are large, being sometimes 100 ft. wide and generally about 150 to 200 ft. long; in one instance over 400 ft. Several of these orebodies occur on one level, being separated by barren bars of limestone. Considerable development is being done and new orebodies are being found. Apparently there are five different ore zones cutting along the limestone, which is about 150 to 300 ft. in thickness. On each side of the limestone are bands of quartzite. Cutting the series of sedimentaries in which the orebodies occur is a series of porphyry dikes, to which it is thought the orebodies owe their formation.

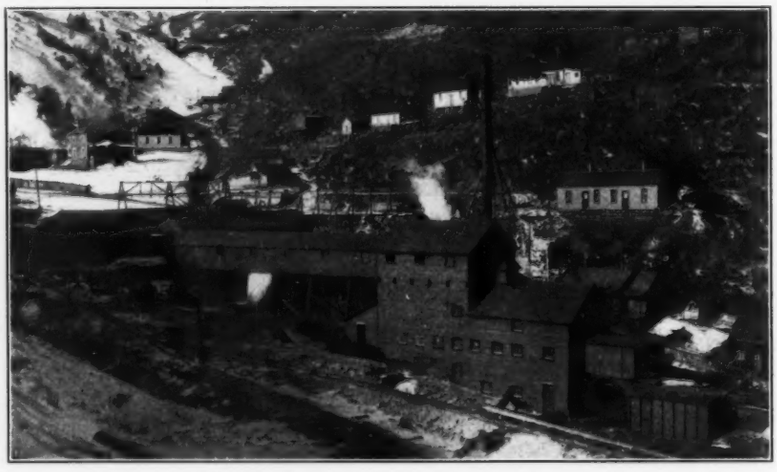
The Highland Boy is one of the most systematically operated mines in the West. The company has its own smelter at Bingham Junction, while at the mine there is not only an assayer, but also a geologist and a surveyor. This presence of a geologist at the mine is purely for the benefit derived from his services in developing the orebodies, and not in any way due to the spur of mining litigation.

Not only is the customary map, showing the drifts on each level and the different raises, made, but also several other maps are kept. These are "floor maps," the assay map, and the geological map. All of these except the assay map are on a scale of 50 ft. to the inch. To aid in locating points, these different maps have been blocked off by a series of co-ordinates 500 ft. apart, running both east and west and north and south.

The floor maps consist of a series of tracings arranged in order, one above the other, on each sheet of which are kept all the workings of the mine on that floor. On it is also shown the direction of any faults cutting the orebodies. On top of the floor maps is placed a tracing showing the contours of the surface of the mining claims. By referring to this contour map the depth of any set in any of the floors can be easily calculated. This is important in mining orebodies occurring near the surface in a region so rugged as Bingham.

A geological map is kept of each level, on which is shown not only the outlines of the orebodies and the boundaries of the different sedimentaries and dikes, but also the strike and dip of all fissures shown up by development work.

A sampler takes daily samples of each round of ground broken in the drifts and of every set of ground broken in the stopes. The samples are assayed for gold, silver, and copper. The percentage of copper determined in each of these samples is noted on the assay maps which are kept in a loose-leaf book. The pages of this book are 30 in. long by 21 in. wide. In the margin, one inch wide, at the top, there are spaces for the number of the floor, the name of the stope and level and also for the name of the orebody to which the stope belongs. The rest of the page, 30 in. long and 20 in. wide, is divided into blocks five sets square. A zero set is taken for



LOAD STATION OF THE TRAMWAY.

each stope and this is kept throughout the different floors of that stope. The sets are numbered both east and west from this set. In each of these squares is written the percentage of copper in the sample from the set which it represents, together with the day, month and year, on which the sample was taken. To assist the eye in determining the monthly progress the squares, representing the sets of ground taken out each month, are outlined in colors, a different color being used for every month of the year. From each page there extends an ear, on which is given the floor and the name of the stope so that one can readily turn to any floor of any stope and determine not only the ore averages in each set of it but also the monthly progress made in extracting the ore.

A stope book is also kept by the assayer in which the sets in each stope are diagrammed. There is also a model of the mine, which is also brought up to date from time to time. It is composed of plates of glass representing each level, placed in a series of shelves in a box. On these glass plates not only are the outlines of the orebodies shown, together with the drifts, etc., but also the geology of each level is shown on it in different colors. The scale of this model is also 50 ft. to the inch.

LOOKING DOWN THE CANYON.

The orebody is opened up by five tunnels. The shortest of these is the uppermost, No. 3, which is 725 ft. long, while the lowest, No. 7, is 2200 ft. long. No. 6 tunnel is 100 ft. above No. 7; No. 5 is 100 ft. above No. 6; No. 4 is 50 ft. above No. 5; and No. 3 is 120 ft. above No. 4. No. 7 is now used for a main working tunnel, and all the ore is sent by chutes down to this level, where it is loaded into trains of six cars holding two tons each and hauled by mule, or horse, to the bins of the receiving station of the tramway. These cars are run by two men from the different chutes to the switches where the trains are made up. Horses are also used on the No. 6 level to haul the ore in trains of 8 one-ton cars from the far chutes to the chutes going down to No. 7 level. A winze has been sunk 100 ft. below No. 7 level and some ore has been blocked out there. Considerable development work is being done throughout the mine, but most of it is being done upon No. 6 and No. 7 levels, while most of the ore being mined comes from above No. 5.

The ore is mined by the square-set system, the sets being carried up from the level below to the one above. In a few cases, where the orebody is adjacent to stopes which have caved to surface, and where consequently the ground is rather heavy, a modification of the square-set system is used.

In the ordinary square-set stopes several sills are lagged with split 2-in. planks, which are then filled with waste obtained from development work; the whole mass of the orebody is mined, there being no waste in it. These filled cribs steady the stopes sufficiently so that the stopes do not have to be filled completely. Of course manways and chutes are carried up occasionally in the sets. Angle braces made from 6x10-in. sticks, or else from round timbers, are used in some places to brace the sets when they begin to take weight. These sets are the same as those at the Boston Consolidated mine, being 5 ft. square, centers, and 7 ft 4 in. high, centers. Two-inch planks are used for floors.

If the stopes are heavy, as when near caved stopes or near the surfaces, the following method is used. A sill is driven in 50 ft. below the top of the stope. A line of square sets is carried clear into the end of the orebody; then a line of sets is carried across the stope and then floors are carried up to the top of the ore. As soon as the ground begins to be heavy the posts of the sill set are blasted out, by loading and firing auger holes bored into them, and the ground above is allowed to cave. Then the rest of the block of ground is mined as before. When one of these blocks, 50 ft. thick, has been mined out and caved, they go down the raise 50 ft. and begin on the block below in the same way.

Rand drills, 3⅛ in., are used in driving the drifts. Two-inch Rand drills and 2¼-in. Sullivans, mounted on tripods, are used in the stopes. Wheelbarrows or small scoop cars on tracks are used to get the ore to the chutes. The breaking of the ore is all done by contract. Stoping costs $9 per set for sill sets, and $3.50 per set for upper sets, including placing the timbers. Drifting costs $3.50 per foot, including putting in timbers when required. The company does the shoveling and furnishes the powder, drills, machines, etc., but the miners have to put in the timbers. The miners are guaranteed $3 per day. Muckers and trammers are paid $2.50 a shift. The company also has timbermen paid $3 to $3.50 a shift, who keep the stopes in shape. There are 325 men employed in the mine and on the tramway.

A Bleichert tram, 1200 ft. long with a difference of elevation of 1000 ft. between the terminals, takes the ore to the receiving bins at Bingham. The stationary cable on the loaded side is of 1¼ in. diameter, while it is 1⅛ in. on the other side. The running cable is ⅞ in. in diameter. The longest span is 800 ft. The towers are made of framed timbers. There is one tension and one anchor station in the tramway. One hundred and twenty buckets are on the line; each holds 720 lb. of ore; the speed is 300 ft. per minute. It takes seven men on a shift to run the tramway. The cost of operation is 7 to 8c. per ton of ore. A grab sample is taken of each bucket as it is loaded. Coal is brought up in the returning buckets.

A Rand two-stage compressor, having a capacity of 1500 cu.ft. free air per minute furnishes air at 80 lb. per square inch to the mine. The company generates its own electricity for lighting. Incandescent lamps are used to light the drifts on the main haulage level, No. 7. Three 70-h.p. fire-tube boilers furnish the steam. Twenty small machines are used in the stopes and about 12 drills, mostly large ones, are used in development work. A Word drill sharpener is used in sharpening the drills. It can sharpen about three a minute and is liked quite well. The large drills are tempered by drawing the temper, as they are used mainly in hard rock while the "chippie" steel is plunged, as it is used mostly in the stopes in the soft ore.

The brine wells in southeast Ohio are in fortunate proximity to good deposits of Pittsburg coal. Some of the salt companies mine their own coal. It is found that 1 bu. of run-of-mine coal will evaporate enough brine to yield 1 bu. of salt.

Steam Consumption of a Modern Hoisting Plant.

BY S. POWELL, JR.

The steam consumption and efficiency of a hoisting engine has always been rather an uncertain quality. This is true for several reasons, the chief one being that local conditions are generally such as to hinder their accurate determination. Moreover a hoist, not being essentially an economical engine, because of its intermittent duty, does not always receive such careful attention and checking upon these points as do engines running under a constant or continuous load. But on account of the rapid strides made in electric-motor control, which has placed the electric hoist in direct competition with those operated by steam, it has become necessary to determine the steam consumption of these engines so that an intelligent comparison can be made between the two classes.

Due to a statement that the steam consumption of a modern steam hoist was 55 lb. per shaft horse-power per hour, the engineering staff of the Consolidated Gold Fields of South Africa made a test on one of its engines, the shaft-power being 33,000 foot pounds of rock hoisted through the shaft, weight of the skip and rope excluded. It is not my intention to discuss the virtues of the steam-operated hoist as against the electrically operated, but merely to show what has been done in the way of steam economy with a modern hoisting plant.

The test was performed on an Allis-Chalmers duplex tandem compound condensing hoisting engine of the Whiting type, located at the Village Deep Shaft No. 1, Witwatersrand. The engine is the same as shown in the accompanying engraving, (Fig. 3) with the exception that it has the regular Whiting drums, while the one in the illustration is equipped with so-called sinking drums. These are removed when the shaft has been sunk to the desired depth, and the Whiting drums are substituted. The engine is of the Corliss type, the high-pressure and low-pressure cylinders being of 17 in. and 28 in. diameter respectively, by 60-in. stroke, each low-pressure cylinder being placed tandem behind its high-pressure cylinder, as shown. The cylinders are steam jacketed and fitted with horizontal spring release Corliss valves of the Seymour type, operated by long radius wrist plate, including quick opening of the valves with a short stroke of the eccentrics. The governor is of the centrifugal type, and so constructed that it rises at a comparatively slow speed, continuing to arise until the desired maximum is reached. In this manner the cut-off comes into operation early, and on the other hand is automatically thrown out of action when the hoist is stopped, so that the valve gear is ready for the next start.

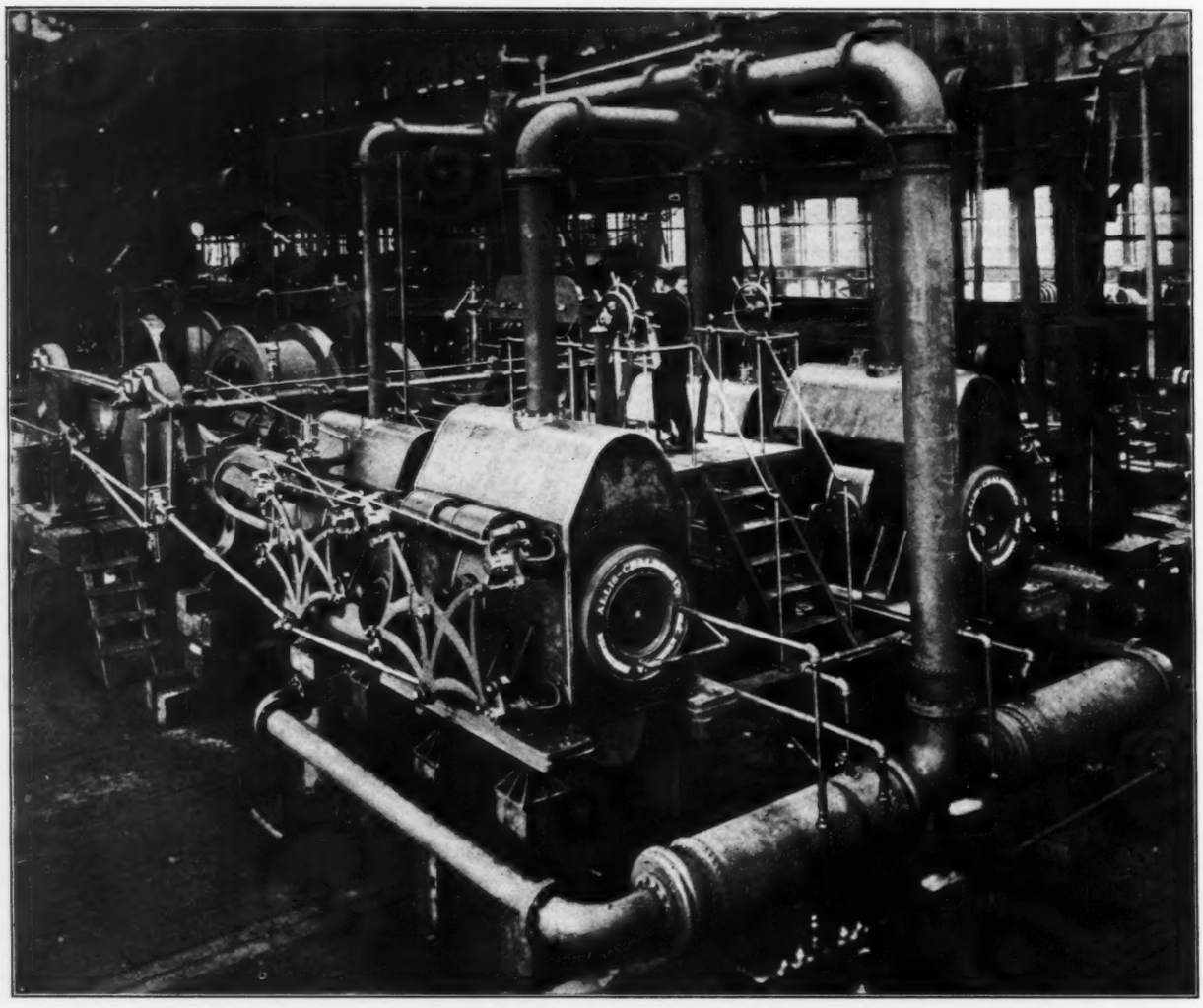


FIG. 3.

The reheater, into which the high-pressure cylinders exhaust, and from which the low-pressure cylinders draw the steam, is provided with a pressure-reducing valve which automatically admits live steam into the receiver until the pressure is 16 lb. above the atmospheric. The brake and reverse engines are operated by steam cylinders having the usual oil-locking device.

The object of the test was to determine the average rate of steam consumption of a modern high-class direct steam-driven

hoisting apparatus under ordinary working conditions, when hoisting ore from a vertical deep-level shaft. The amount and quality of the steam going to the hoist and its auxiliaries, and the work done, were determined; but there was no attempt to determine the performance of the steam-generating plant.

Ore hoisting at this mine is done from only one level, but men and materials are handled from different levels, not very far apart. The shaft is vertical, and the ore, after being raised, is automatically dumped into a bin built against the head frame, whence it is loaded into 20 cu.ft. V-trucks, and transported by a continuous rope haulage to the sorting station. The hoist stands to the south of the shaft, and immediately to the right of the engine house is the boiler, with the condenser house between the two. The tail rope intended to be used was not yet installed and the hoisting load moment, therefore, varied considerably during each trip.

The air-pump discharge, together with the discharge from the cylinder jackets, low-pressure receiver jackets, and low-pressure receiver drainage, is delivered to a tank which, for reference later, may be designated tank "A," situated to the north of the boiler house. From this tank the hot-well is fed, after the oil has been removed from the water. The drainage from the steam separator in the steam pipe between the boilers and the hoist, together with the drainage from the steam pipe to the winch, which alters the levels from which hoisting may take place, goes through the dry room to this tank "A." The exhaust of the reversing and brake engines on the hoist, together with the exhaust from the boiler feed pumps, pass through a pipe coil in the hot-well and thence also in the tank "A."

The exhaust from the steam cylinder of the circulating and air pump has two connections, one to the condenser direct, and the other to the low-pressure receiver of the hoist. The connection to the condenser, however, is so arranged by means of a spring-reducing valve that, when the pressure in the receiver is less than the desired amount, the exhaust all goes to the receiver, but when the receiver pressure is as high or higher than the desired amount, the exhaust goes direct to the condenser.

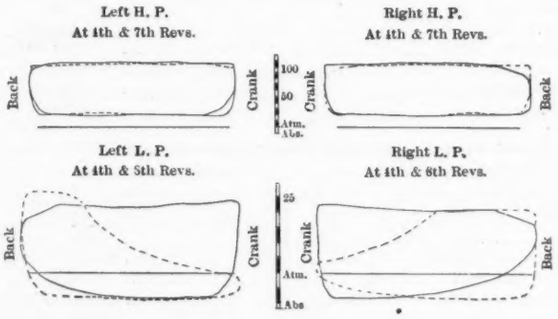


FIG. 1

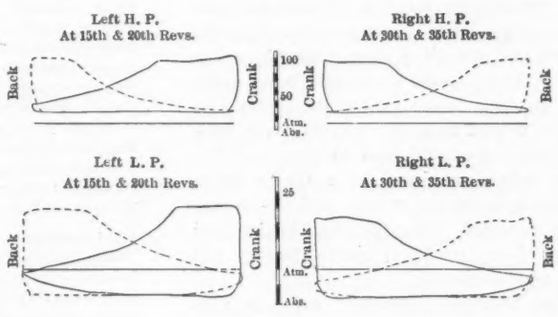


FIG. 2

THE TEST ARRANGEMENTS AND METHODS.

General—The test was started at 8 h. 30 m. 30 sec., a.m., Feb. 16, 1906, after the day shift had been sent underground and ore haulage begun. The condenser had been previously tested with the engine running on the atmosphere and no leakage was found.

Measurements of Water—The air-pump discharge, together with the discharge of the cylinder and receiver jackets, instead of going to tank "A," was deflected into a small tank, thence over a weir into a second tank, with a valve and pipe which delivered into the weighing tank on a platform scales. After the tare of the weighing tank had been taken, it was filled, weighed, and water then allowed to run to waste. This operation was repeated as often as required. The pipe delivering into the weighing tank had its free end in plain sight, as also the pipe which discharged the water from the weighing tank, so that any leakage past the valves could be seen during the whole time of the test. There was no leakage.

The drainage from the steam separator and from the winch supply pipe was thrown to waste, and not measured. The winch is not required when hauling ore, and was, therefore, not operated. The exhaust from the reversing and brake engines was also thrown to waste during the test, as it was found at the last moment that the pipe connections did not permit of separating this water from the exhaust of the boiler feed pumps.

The determination of the steam consumed by the reversing and brake engines was made the following day, when suitable arrangements had been made for condensing the whole of it separately. There is no steam consumed by these engines when the main engine is standing, as the flow of steam is stopped by the valves controlling these engines. The steam consumption was, therefore, measured for a period extending over 113 trips on hoisting ore, and the average steam consumption per trip determined. This multiplied by the number of trips during the test was taken as the total amount of steam chargeable to this part of the plant.

Calorimeter—A Peabody's throttling calorimeter was used to determine the quality of the steam between the steam separator and the engine. The pressure gage, carefully calibrated, was mounted on the steam pipe above the sample opening. The pressure in the calorimeter chamber was taken by a mercury column, and readings taken every quarter hour.

Measurements of Ore—A track platform scales was inserted in the track leading from the ore bin at the head frame to the hook-on point of the mechanical haulage, and every truckful of ore weighed by two observers and one assistant. Each observer noted the number and weight of each truck load in his book, and, besides this, a ticket bearing the number of the truck was punched with the registered weight by a recording device on the machine, and the ticket put into a kind of ballot box. Afterward the ticket and books were checked against each other. Immediately after the test, all the empty trucks on the haulage circuit (59 in number) were each weighed separately, and the average weight taken. This multiplied by the number of trucks passed over the weighing machine during the test was taken as the gross tare, and subtracted from the gross weight of the loaded trucks. Before the test, the ore bin at the

SUMMARY OF DATA AND RESULTS.

Duration of test	7 hr. 5 min. 0 sec.
Total ore hoisted	1,542,213 lb.
Depth hoisted from (vertical)	2,290 ft.
Total indicated work in cylinder	4,145,821,180 ft. lb.
Total steam consumption	45,579 lb.
Average initial steam pressure (absolute)	132.30 lb. sq.in.
Average final steam pressure (absolute)	2.01 lb. sq.in.
Average moisture in steam supplied	0.565 per cent.
Principal Results:	
Average shaft horse-power	251.812 h.p.
Average indicated horse-power	295.602 h.p.
Average steam consumption	6,434.682 lb. per hr.
Average steam consumption per shaft h.p. hr	25 5535 lb.
Average steam consumption per i.h.p. hr	21.768 lb.
Mechanical efficiency of hoisting apparatus	85.186 per cent.

head frame had been cleaned out, and also the floor at the loading doors. This was again done after the test. The weighing machine was tested with standard weights after the test, and found to record accurately differences of 1 lb. in weight.

Indicator on Engine—To determine the work done in the cylinders of the hoist four continuous integrating indicators, made by W. G. Little, of Kent, were used. They were attached to the cylinders by the usual pipes and three-way cocks. The index of each was turned to zero, and the mechanism allowed to run for five rock trips when connected to, say, the crank end of each of their respective cylinders. Then, in the interval between trips, the readings were taken, the three-way cocks turned to connect to the back end, the indexes turned back to zero, and five trips taken on that end, readings taken again, indexes set to zero and the operations repeated. Thus one-half of the total work done in the cylinders during the test was measured.

Two of these indicators had been previously tested against the well known Crosby indicator on continuous-running mill engines, and found to read too low, one 5.3 per cent. too low, and the other 4.9 per cent. too low. The work in the cylinders measured during the test was therefore corrected, assuming an average of 5.1 per cent. too low, and the result multiplied by two, to give the total indicated work during the test.

Trips—A careful record of the time of beginning of each trip was kept and the actual running time of each was observed by a stop watch reading to fifths of a second.

Remarks—A record was kept of pressures, temperatures, barometer, etc., taken periodically. All instruments except thermometers were calibrated and tested with best procurable standards. The observers were men conversant with their work and experienced in observation of this kind. A series of indicator cards with ordinary indicators was taken on the day following the test, no valve adjustments or any conditions having been altered in the meantime. The two diagrams (Figs. 1 and 2) accompanying this description are average cards selected from numerous specimens illustrating conditions at various portions of the trip time. They are self explanatory.

A summary of the results of the test and the data acquired are given in the accompanying tabular forms.

Particular attention is called to the steam consumption and the mechanical efficiency of the hoist, which, considering the fact that no tail rope was used, is unusually good. The test was made under the direct supervision of E. J. Lashinger, A. M. Robeson and H. C. Behr. I am indebted to the South African Association of Engineers and especially to the gentlemen mentioned above for the data on this test.

SUBSIDIARY OBSERVATIONS AND DATA.

Pressures:		
Atmosphere pressure (average) 24.52 in. of mercury	12.04 lb.	sq.in.
Steam pressure (average) gage	120.26 "	"
Vacuum (average) 20.43 in. of mercury	10.03 "	"
Receiver pressure (average) gage	19.30 "	"
Jacket steam pressure (average) gage	34.10 "	"
Temperatures:		
External air (average)	73.1 deg. F.	
Engine room (average)	78.6 "	
Air pump discharge at weighing machine	82.7 "	
Circulating water inlet	75.3 "	
Circulating water outlet	83.5 "	
Ore:		
Total gross weight over scales	2,264,217 lb.	
Total weight of trucks	722,004 lb.	
No. of trucks (20 cu.ft.) weighed	785	
Average weight of truck	919.75 lb.	
Average weight of ore in truck	1,964.60 lb.	
No. of skips hoisted	205	
Average weight of ore in skip load	7,571.8 lb.	
Weight of skip, approximate	6,5(0 lb.	
Trips Made During Test:		
Number of trips on ore (includes one trip materials down in one skip with one coming up in other skip)	205	
Number of trips men up or down	3	
Number of short landings	11	
Total number of trips	219	
Total number of revolutions of engine	12,627	
Number of revolutions per full trip	60.75	
Actual running time during test (total)	4 hr. 40 min. 25.7 sec	
Actual running time on ore	4 hr. 36 min.	
Condensed Steam:		
Main engine cylinders, jackets and condenser pumps	42,286 lb.	5,969.788
Reversing and brake engines	3,293 lb.	464.904
	45,579 lb.	6,434.682

SUBSIDIARY RESULTS.

Actual running time during test to total time	65.98 per cent.
Average engine i.h.p. during test	295.602 = 100 per cent.
Average frictional h.p. during test	43.790 = 14.814 per cent.
Average shaft h.p.	251.812 = 85.186 per cent.
Average engine i h.p. for average trip on ore	448 i.h.p.
Average time for trip on ore	79 sec.
Average mean rope speed on ore	1,740 ft.-min. or 29 ft.-sec.

STEAM CONSUMPTION.

Main engine and jackets, and condenser pumps per shaft h.p. hour	23.7073 lb. = 92.775%.
Reversing and brake engines	1.8462 lb. = 7.225%.

ENGINE DATA.

Whiting hoist, 12 ft. dia. sheaves direct connected, 5 grooves in each sheave, sheaves 16 ft. centers.

Cylinders—h.p. 17 in. dia., l.p. 28 in. dia. x 60 in. stroke.

H.p. cylinders toward crank and l.p. cylinders behind. Main piston rod 4¼ in. dia.; rod between h.p. and l.p. 3 5/16 in. dia.

No tail rods at back of l.p. pistons.

Corliss valve gear, Seymour wrist plate motion, steam reversing and brake engines.

Distribution of work in cylinders:	
Left h.p. cylinder	21.8 per cent.
Right h.p. cylinder	18.1 "
Left l.p. cylinder	30.3 "
Right l.p. cylinder	29.8 "
Left-hand side	52.1 "
Right-hand side	47.9 "
H.p. cylinders	39.9 "
L.p. cylinders	60.1 "

Equivalent total number of indicator cards taken, 50,508 or ½ of possible total.

CONDENSER DATA.

Wheeler condenser, Admiralty type, with direct-acting steam-driven air and circulating pumps underneath condenser.

Cooling surface	3000 sq.ft.
Steam cylinder of pump	16 in. dia. x 24 in. stroke.
Air pump	18 in. dia. x 24 in. stroke.
Circulating water pump	20 in. dia. x 24 in. stroke.
Speed of pumps about 16 single strokes per minute.	
Suction of circulating pump	12 in. dia. 160' long.
Delivery of circulating pump	10 in. dia. 160' long.
Static lift of circulating pump about	9 ft.
Static lift air pump about	20 ft.

GENERAL DATA.

Steam pipe 8 in. dia. 40 ft. long between separator and throttle.
Exhaust pipe 14 in. dia. 48 ft. between engine and condenser.
Hoisting rope 1¼ in. dia. No tail rope.
Horizontal distance between front sheave of winder and center of shaft about 126 ft.
Hight of head frame, ground to center of sheaves about 60 ft.
Horizontal distance from sheave of winder to rope anchorage pulley about 305 ft.
Head frame sheave 12 ft. dia.
Anchorage sheave 12 ft. dia.
Deflecting sheave 8 ft. dia.
Erection of plant completed about August, 1903.
Plant has been in operation since about November, 1904.

Hematite Mining in New York.

BY ROBERT B. BRINSMADE.*

In southern St. Lawrence county a series of red hematite deposits extends from the Dixon mine in Antwerp, through Rossie, to the Clark mine in Gouverneur township, a distance of five miles in a northeasterly direction. The principal producing mines have been the Dixon, Sterling, Keene, Caledonia, Little Caledonia, Carney and Clark, of which only the Sterling and Caledonia are at present in operation. The ore is not continuous, having been found in quantity only at the above mentioned mines, where it outcropped so as to allow the extraction of a large tonnage with open pits. The outcrops occur, not in hills, but in low "welts" in the meadows where the rock strata cut through the surface soil. Several outcrop pits are extensive, the largest square. A sample of Caledonia serpentine gave 46.90 per cent. SiO_2; 35.73 Al_2O_3; 1.28 $MgO + CaO$; 6.89 $Na_2O + K_2O$; 2.48 FeO; 5. H_2O. In the Clark mine, this serpentine is only on the hanging wall under the sandstone; in the Caledonia, it is often separated, near the surface, by large bodies of ore, from both the sandstone and the limestone footwall. In the Sterling, it occurs as a shell, 10 to 15 ft. thick, under the sandstone hanging wall.

The ore from the Caledonia mine is sorted for shipment to exceed 50 per cent. metallic iron; to attain this from 20 to 40 per cent. of the vein matter broken must be thrown away. A typical analysis of Caledonia shipping ore is 52.71 per cent. Fe; 0.15 MnO; 1.69 Al_2O_3; 7.04 CaO; 0.38 MgO; 10.12 SiO_2; 5.41 CO_2; 0.03 S;

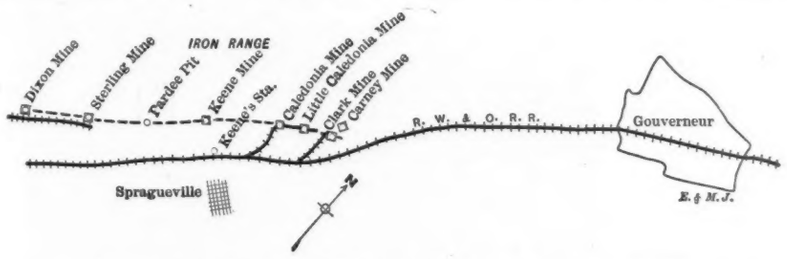


FIG. 1. SKETCH MAP OF IRON RANGE, ST. LAWRENCE COUNTY, N. Y.

being that of the Sterling mine, which is 300 ft. long, 60 ft. wide, and 100 ft. deep.

Geology—The metamorphic strata of the Oswegatchie, or Grenville, series of the Cambrian period follow the iron range with a northeasterly strike and with an easterly dip of 20 to 45 deg. from the Keene mine northward, but with a westerly dip of 60 deg. in the Sterling property. The strata all along give evidence of movement, and the Keene, Caledonia and Clark mines are located on tilted anticlinal folds. The orebodies have local variations, but their similarity, both in the chemical and physical constitution of the hematite and in the nature and situation of the wall rock, gives evidence of a common origin.

The hanging wall of all the deposits is Potsdam sandstone (rare in the region except near the iron mines) which rests unconformably on the underlying footwall of Grenville strata. The footwall is crystalline limestone in the Clark and Caledonia mines; in the Keene and Sterling it is gneiss. Both the limestone and gneiss are metamorphic rocks of undoubted sedimentary origin.

Between the foot and hanging walls of the mines occurs a rather soft greenish rock (locally called "serpentine"), mottled with white spots and showing in places abundant highly polished slickensides, sometimes covering an area of 100 ft. and trace of phosphorus. The rejected material consists of hematite mixed with silica, calcite or serpentine, especially the last. Sheets of a greenish schist analyzing about 20 per cent. Fe are commonly interbedded in the ore, as are also layers of soft irony shale. Streaks of quartz occur rarely.

Massive, hard, blue specular ore is the best produced; it is interspersed with stringers of calcite and is usually pockety. The bulk of the pay ore is red hematite; some is hard, but more of it consists of micaceous iron ore, soft as clay. The workable bodies are very irregular; a recent stope of the Caledonia, which averaged 18 ft. thick for a length of 200 ft. and a depth of 150 ft., was abruptly broken off all around by the sharp drop of the serpentine roof upon the limestone floor; one stope in this mine was in portions 80 ft. thick. In the Clark mine the ore at the north end, adjoining the Pike No. 2 incline, was 40 ft. thick, but gradually diminished, as it circled the conical limestone hill that served as a footwall, until it was only 10 ft. thick around the Pike No. 3 incline.

The rich specular ore has been most abundant in the Keene and Caledonia mines; the latter being the only mine in late years shipping ore of 50 per cent. grade, the output of the Sterling and Clark being only 45 per cent. The specular ore is unsuitable for metallic paint, but the soft, red hematite grinds well even when under 45 per cent. Fe. Tongues of ore often project from the main bodies into cavities in the limestone or serpentine, and swells or pinches of the pockets are of frequent occurrence. Besides the impurities above mentioned, foreign minerals in the hematite are few; pyrite, magnetite, siderite and millerite are found in small quantities, and the rare chalcocite forms velvety coatings at the Sterling mine.

Many theories have been advanced to account for the origin of these deposits, but the evidence seems to indicate that the serpentine is a decomposed igneous dike intruded between the sandstone and the underlying rock, which caused fissures extending sometimes on both sides of the dike (as at the Caledonia) or only on one side (as the Clark and Sterling); these fissures being finally enlarged by the same earth movements that produced the slickensides now seen in the serpentine. Erosion and decomposition of the exposed top of the dike then began, and the ferruginous silicates, like augite, were broken down. The iron was then leached out by surface waters containing carbonic dioxide, and then precipitated around the lumps and rock débris previously washed down into the fissures. Lower down the dike was altered to the serpentine now found in the mines. As the ground surface sunk by erosion, so did the ore in the fissures, with consequent concentration and purification of the deposit.

This theory does not presage a great depth for the orebodies. However, none of the large mines (except the Keene) has been bottomed, and the indications at the lowest level of the deepest mine, the Caledonia, give promise of as good bodies as were extracted near the surface.

History—The Caledonia mine was opened prior to 1813; the Carney and Keene pits not long afterward. The adjoining Clark mines were not developed until 1879; but the southern group is older, the Sterling starting in 1836, the White in 1848, the Ward in 1852 and the Dickson in 1870.

The first furnace was built by David Parish, in 1815, at the village of Rossie, from which date to its final abandonment in 1867 it produced nearly 25,000 tons of pig. The furnace was chiefly supplied from the Caledonia mines, 13 miles distant; as competitors there were similar furnaces at Sterlingville, Sterlingburg, Fullerville, Lewisburg, Alpine and Carthage. All these stacks were small and crude affairs for making cold-blast charcoal iron, and with the growing scarcity of charcoal they were one by one abandoned; the last survivor (at Sterlingburg) lingered until the southern group of mines was purchased by the Jefferson Iron Company, in 1881.

When the Rossie Iron Works acquired the Caledonia mine in 1864, shipments of the ore to central New York, Hudson river or seaboard furnaces, and even occasionally to Europe, was begun. So much

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was this ore in favor with ironmasters (on account of its freedom from sulphur and phosphorus and other impurities, its lumpy character and its self-fluxing qualities) that over 300,000 tons were marketed between 1864 and 1885. Shipments in single years sometimes exceeded 40,000 tons.

In the early nineties, the Keene mine, one of the largest producers, pinched out and the falling price of ore discouraged operations at the other mines. The panic of 1893 caused a general shut down, accompanied by the bankruptcy of the Caledonia mine, of which the elaborate equipment of machinery was sold at auction and shipped away. The district was then practically idle for six years, but in 1900 the Sterling mine was pumped out and the largest steam-power plant of the district installed; however, the work since then has been conducted only in summer, and the annual average output has not exceeded 12,000 tons. Shortly after the Sterling was reopened, Chas. Westbrook unwatered the Caledonia mines, and partially re-equipped them with machinery. He sold them in 1901 to the Rossie Iron Ore Company, which put them on their present productive basis of 20,000 to 40,000 tons yearly. In 1901 the Clark mine began again, and shipped ore in an intermittent fashion till the autumn of 1904.

Prospecting—As the mines were all started on the extensive outcrops, and the orebodies beneath are generally connected by stringers, but little dead-work prospecting has been done. The only instance of diamond drilling was some years ago at the Caledonia mines, where several holes were put down with good results. These bores were begun at the surface, as the gentle dip of the ore, below the 300 ft. level, made the distance to go small.

It has been the custom to do excavation for development only in pay ore, wherefore it is possible that many orebodies in the old workings have been missed, which could have been found by drifting along the contact of the pinched-down hanging and foot wall. The subsequent fall of the roof in many of these old workings would make any attempt to do this neglected exploration at the present time a losing proposition.

Shaft sinking—The details of shaft-sinking practice that follow are those of the Caledonia unless otherwise stated. The old Keene shaft was vertical, as is also an abandoned one of 200 ft. depth at the Caledonia, but the present working openings are inclines following the dip of the veins. The Caledonia incline is sunk on an angle of 45 deg. for the first 360 ft. (through footwall schists) and then assumes a dip of 20 to 25 deg. to cut the lime footwall and reach the ore at 550 ft.; whence it follows the footwall to the present sump at 700 ft. depth.

The incline is opened to the hight of the ore and 18 ft. wide, affording space for two skip tracks (60-lb. rails, 3 ft. 4 in. gage) together with a stair and pipe way. It was sunk to the 600-ft. level with the main two-ton hoisting skip; but below that a one-ton sinking skip is used, so as not to retard production from the stopes above. An air hoist, set on a platform over the main skipway, raises the sinking skip, to dump it into a small bin in the hanging wall above the 600-ft. level; this bin can spout into the main skip, which runs beneath it.

The track for sinking is kept on the center line of the shaft, to run the skip as near as possible to the face for loading rock; the last pair of rails is only 15 ft. long, laid on their sides to prevent injury from blasting. As soon as sinking progresses far enough to make room, a pair of 30-ft. rails (also laid sideways) is substituted for the 15-ft. pair and it is not until sinking is advanced enough for the insertion again of the 15-ft. pair that the 30-ft. pieces are turned up straight and fishplated to those behind.

When sinking has reached a sufficient depth to start several new levels, at intervals of 40 to 50 ft. on the incline, the sinking hoist and bin are removed and the sinking track connected and lined up laterally with the main track above. At the same time, the sinking track can be somewhat alined vertically by grading it up with waste or, for large holes, with wooden trestles.

In the Caledonia, the water encountered in sinking is handled by a No. 1 Cameron pump (with a No. 4½ Blake for a relay) which raises it to a sump in the floor of the lowest working level; but in the Sterling mine, where there is a large flow, the following sinking scheme is used. A small winze is first sunk from the floor of the bottom level, and 50 ft. away from the shaft. This winze is made 30 ft. deep along the footwall (21 ft. vertically), so when a drift has been driven from its bottom, and a sump cut, and a raise holed through from the sump into the bottom of the main shaft, there is then no difficulty in sucking out the inrushing water. This is achieved by extending into the new sump the suction pipe of the large Canton pump, set on the lowest level, just 21 ft. above. A new pump station is then cut at the foot of the raise; the Canton pump is lowered and installed in it, and work can then proceed regularly in the new level.

Drifting and stoping—The method of ore extraction now used in the Caledonia mine, which was the first to apply it, is as follows: Every 40 or 50 ft. along the incline (when in ore) a drift wide enough to reach from the lime foot to the serpentine hanging wall is started, and of a hight sufficient to allow an arched roof, as at *F*, Fig. 3. When a drift has advanced far enough from the incline to leave a sufficient pillar, as at *D*, a raise is started and driven just under the hanging wall to the level above at *C*. When this raise has been holed through, one drill is started at the top and (with down holes and underhand stoping) the ore is broken off clean down to the footwall except a narrow bench left at the top, as at *R*. Simultaneously, another drift is cutting underhand benches at *G* to extend the stope to its full length. When a stope is cut as long in the strike as the roof will stand, it is squared down, as at *J-K*, preparatory to starting another drift and raise under a new pillar, as at *L-M*.

This system conforms well to the pockety nature of the deposit. When the ore has pinched out, as at *N*, the drift is not continued beyond the end of the stope, but the advancing for the levels below is done at *P*, when there is still ore in the face. In order to prevent a fall of ground from descending more than one level, each stope has, as far as possible, a pillar below it, as shown in Fig. 3.

Drilling—In shaft sinking, the lime foot-

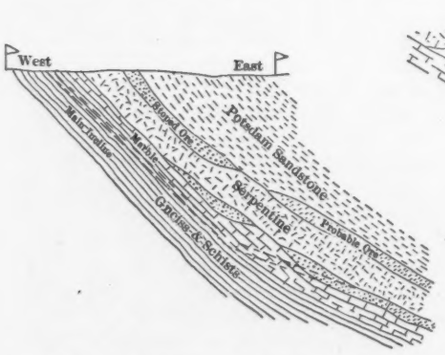


FIG. 2. GEOLOGICAL CROSS-SECTION OF CALEDONIA MINE.

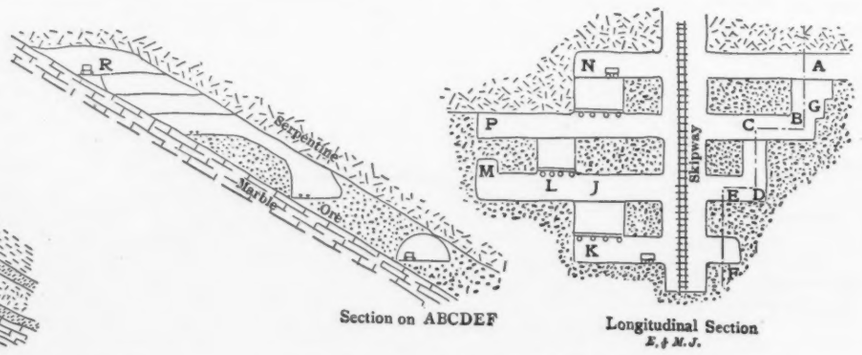


FIG. 3. ORE EXTRACTION SYSTEM, CALEDONIA MINE.

wall is followed, and a cross section of 18x8 ft. is excavated. The center-cut system is pursued and two drills, with two men on each, are set on vertical columns to drill during the day shift the four to six 8-ft. holes necessary for each side of the cut. The cut is blasted at 5:20 p.m. by electricity and the débris cleaned up by muckers on the night shift. On the next day shift, the five to six end holes to complete the round are drilled by each machine, blasted and mucked out the following night. This speed is for soft hematite; when the face is specular ore it may take five or six shifts to finish a round instead of four. Long delays are also caused by the scalers, who take down the vein matter above the original shaft excavation as far as the hanging wall, both to render the roof safe for the sinkers below and to recover the ore. These hindrances render it difficult to average an advance exceeding 12 ft. per week of 13 shifts, or 117½ hours actual working time.

In the whole mine there are eight McKieran rock drills of 3-in. size; it was found that the 2½-in. size, though lighter to carry around the stopes, could not economically be made to strike a heavy enough blow in the hard specular ore. The rate of drilling varies with the ground. In the red ore, seven 6-ft. holes per shift are as easily put down as are two 6-ft. holes in the hardest specular; uppers, sufficiently steep to shed the dust, and down water-holes, drill faster than flat holes, as is usually the case. Before loading, the holes are freed from cuttings by a wooden swab; down holes are blown out by a 1-in. pipe, attached to the compressed air hose.

In sinking, drifting and raising, the double screw with arm is in use, all new orders are made of 4-in. wrought iron pipes, but to utilize the old 3-in. column arms and fittings (formerly employed on the discarded 2½-in. drills) extra heavy 3-in. pipe was ordered, and found to be steady enough for the large drill, even when in 8-ft. lengths. For drilling on the underhand benches, tripods are usually necessary; but the drillers prefer to stand on them to make them steady in operation, rather than to put on their legs the customary counterweights. The constant breaking of the set-screws in the extension legs of the tripods was almost entirely prevented by the substitution of soft-iron round bars for the old drill butts the drillers insisted on using for extension.

Blasting—Electric caps are used only in shaft sinking; elsewhere the heavy shocks of simultaneous firing shake up the serpentine roof too much to be safe. "Silver medal" caps and single tape fuse are in vogue, the fuse being cut in equal 4- to 6-ft. lengths and its split ends ignited in the order required by the round of holes. Double tape fuse is kept for wet down holes, as it saves the careful drying before loading essential for the single tape variety.

The drillers are erstwhile Austrian farmers, whose mining knowledge is limited to putting in and loading the machine holes; hence the placing of the holes and the quantity of powder to use must be directed by the American shift boss. Everything is blasted with 40 per cent. dynamite, except the shaft, drift and raise cuts in specular ore, which are broken by 50 per cent., with 60 per cent. for the primer cartridges. Three half-pound sticks will usually break a 6-ft. hole, when firmly tamped with a small clay ball.

Blasting (except for block holes) is done generally just before the end of the shift, each pair of drillers touching off their own holes on a signal from the shift boss. Misfires, arising from the failure of the cap to explode, are blasted at the beginning of the next shift by inserting a new fuse and primer cartridge after removing the clay tamping. When the powder has blown out without breaking the rock, the remedy, if from insufficient powder, is obvious; if from wrong position of the hole for breaking, an auxiliary hole must be put in alongside.

(To be continued.)

FIG. 4. CLAUS MINE.

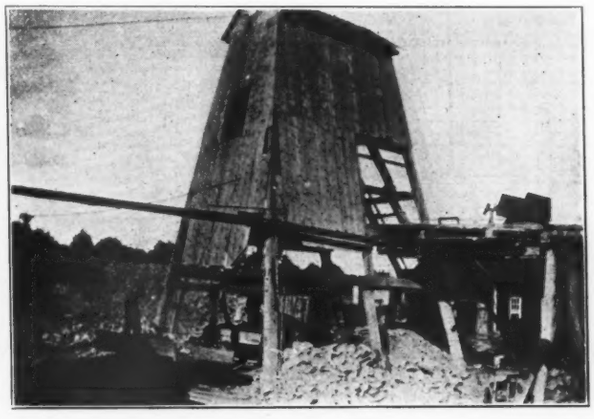


FIG. 5. HEAD FRAME, CALEDONIA MINE.

In drifting, the common method of four horizontal rows of three 6- to 8-ft. holes is used; one drill on a vertical column, set but once for a round, does the drilling. The second row from the bottom is pointed down about 45 deg. for the cut and is fired first, followed by the bottom, third and top rows in order. For soft ground nine holes are enough, the center hole of the second, third and top rows being omitted. When the drift exceeds 8 ft. in hight, a heading is advanced above and the floor is cut up behind by lifters; or, in case of a thick floor bench, by vertical down holes.

The raises are at least 6 ft. high and 10 ft. wide to admit of easy breaking for one drill. No regular system of placing holes is in vogue; the bottom, side or top cut being taken to best break the ground, with the drill column set vertically and usually but once a round.

In the underhand stoping the holes are seldom quite vertical, or over 8 ft. long, as the irregularity and low dip in many places of the footwall make the regular vertical benches and deep holes of an open quarry impracticable.

Scarcity of Labor in Germany.

The scarcity of labor is now a serious problem in Germany as well as in America. Consul H. W. Harris, of Mannheim, reports that the shortage of workmen now prevailing in Rhineland and Westphalia surpasses that of any previous year.

This scarcity is noted not only in the iron, steel, and coal industries, but also in the building trades. The activity in the latter trades is especially noteworthy. It is stated that in all the cities of these regions old buildings are found to be inadequate for present demands and are giving way to large modern buildings, requiring thousands of workmen in their construction. Employees in the building trades are for the most part German citizens, while on public works, in mining, etc., large numbers of foreigners find employment, native labor being wholly insufficient to supply the demand.

The mica industry of New Hampshire is reviving. At Alexandria several mines are being equipped, and a mill will treat the by-products, quartz, feldspar and small mica.

Some Characteristics of Coal as Affecting Performance with Steam Boilers.*

BY W. L. ABBOTT.

The capacity and efficiency obtained with a steam boiler is the result of many influences more or less variable in character, and for the purpose of studying some of these, certain experiments were conducted in which coal screenings were used, the results of which are presented in this paper.

The apparatus employed consisted of two Babcock & Wilcox boilers, one being

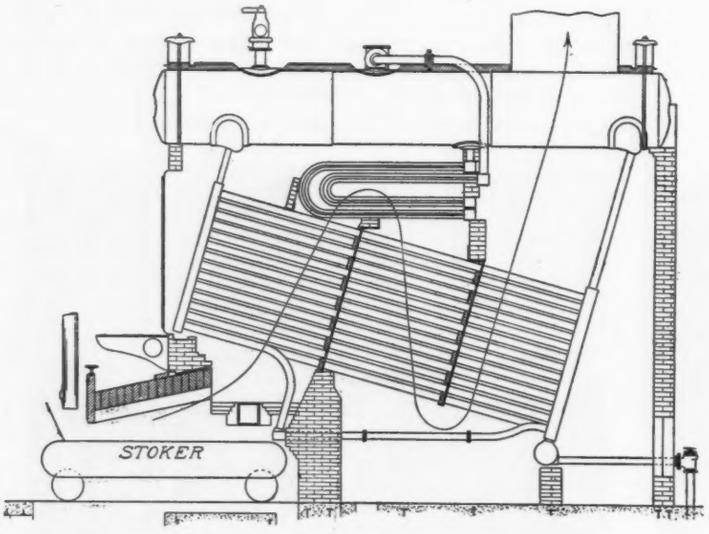


FIG. 1.

14 tubes high and 18 wide, of approximately 5000 sq.ft. of heating surface, fitted with a chain-grate stoker of 75 sq.ft. in area, which discharged the gases of the fire from under an ignition arch 5 ft. long, immediately among the tubes of the boiler; this boiler was also fitted with a Babcock & Wilcox superheater having an approximate area of 1000 sq.ft. The other apparatus employed in one of the series of tests differed only in sizes; its boiler was 12 tubes high and 16 wide, contained 4000 sq.ft. of heating surface, provided with a superheater and served with a chain-grate stoker of 66 sq.ft. in area. Fig 1 is a sectional elevation of the larger boiler.

The experiments were for the purpose of studying the following features, and their influence with the particular apparatus used, and are presented in the following order: Effect on capacity and efficiency due to coal of different sizes; influence of ash in coal on capacity and efficiency; effect of variation in size of coal screenings; results of different thicknesses of fire.

The experiments illustrated by Fig. 2 consisted in the use of coal separated into various sizes by means of screens having the following square openings: 0.25, 0.50, 0.75. 1.0, and 1.25 in. The coal was all from one lot, so that the different portions resulting from the screening process were necessarily the same kind of coal, except that some portions were uniformly larger and others smaller, and that the smallest, on account of its size, was the highest in ash. As shown by the curves of efficiency and capacity in the diagram, five tests were made, each with a different size of coal. In all other respects, however, everything was equal; thus influencing conditions, except that due to size of coal, were constant. In this way, relative values for the feature studied were obtained.

The percentages of ash in the dry coal of the various sizes were as follows:

	Square screens. Through.	Over.	Ash in dry coal.
Size of coal in inches....	1.25	1.00	13.7
Size of coal in inches....	1.00	0.75	14.0
Size of coal in inches....	0.75	0.50	15.6
Size of coal in inches....	0.50	0.25	20.8
Size of coal in inches....	0.25	0.00	30.8

The high percentage in the smallest size is not due to ash in the coal itself, but to the fact that all of the fine sized foreign matter separated from larger coal, or which comes from roof or floor of the mine, naturally finds its way into this smaller coal.

Fig. 3 gives results of 18 tests made to determine the effect of varying quantities of ash associated with coal. One result of its presence is to reduce the heating power, owing to displacement of combustible matter. Therefore, in this connection, ash may be considered as a dilutant, and if this were the only result of its presence, it would have no effect on heat efficiency secured through a boiler. A proportionately less amount of water would be evaporated by a pound of such mixture of ash and coal, of course, but efficiency would not be affected. If, however, ash acts in some other way as well, such as an obstruction to the combustion process, the effect of its presence is doubly harmful.

To insure that the result would not be affected by any influence other than that of the ash, special coal was used which came from the No. 7 seam, north of Marion in Williamson county, Ill. It was prepared in a Stewart washer and is known to the trade as No. 4 washed coal, a size made by passing over a screen having ¼ in. round openings, and through one having similar ½ in. openings. Its composition is represented by the following:

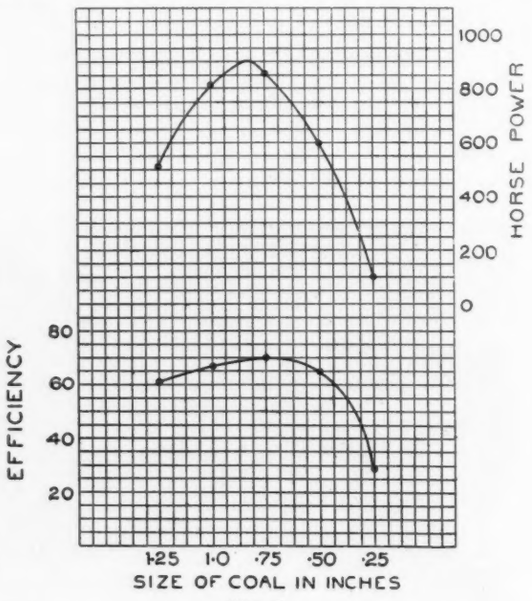


FIG. 2.

Moist Coal:	
Moisture	7.48
Ash	8.23
B.t.u.	12,191
Dry Coal:	
Ash	8.90
B.t.u.	13,176
Pure Coal:	
B.t.u.	14,463

The test indicated by the two points showing highest efficiency and capacity was made with coal just as it arrived, or, in other words, was of the composition shown by the analysis. Beginning with the test of the second day, a quantity of refuse from the stoker ash pits was added to the coal to be used. This refuse was first weighed and the large pieces broken up, after which it was thoroughly mixed with the coal in the required proportion and increasing amounts were added in each test which followed. This fuel composition was, of course, weighed as used and a sample of it selected for analysis in the regular manner.

It appears from the diagram that useful effect from the fuel drops to zero with 40 per cent. of ash, notwithstanding the fact that the other 60 per cent. of the composition was pure coal. The fact should be emphasized that, although over half of the composition fed to the fire was

*Abstract from paper read before the Western Society of Engineers, Sept. 5, 1906.

fuel, it burned without producing any useful effect, for which there are two reasons; one that, on account of obstructed air supply through the fuel bed, incomplete combustion and escaping hydrocarbons carried away a portion of the heat, because the gasses passed immediately among the tubes of the boiler. The other is that, owing to the presence of an excess of ash, the percentage of fuel on the rear portion of the grate is greatly reduced. On this account a larger proportion of the air passing through the fuel bed does not combine with the fuel, but enters the furnace as free air. As the prime function of a furnace is to heat the gases passing through it, any increase in the amount of air entering the furnace without a corresponding increase in the amount of fuel burned must result in a lowering of the furnace temperature.

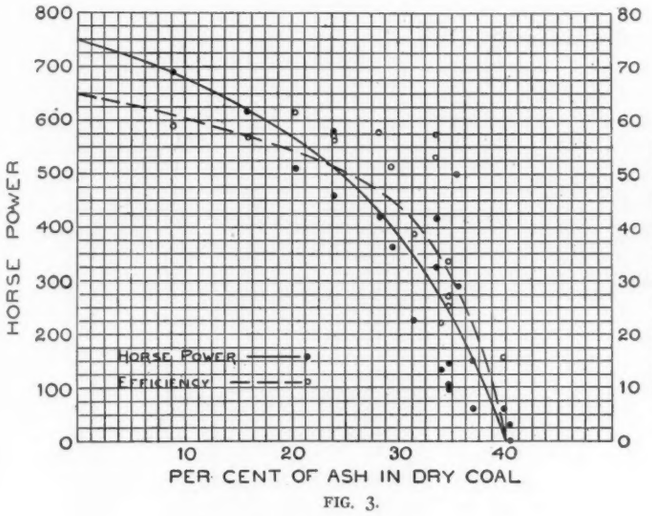


FIG. 3.

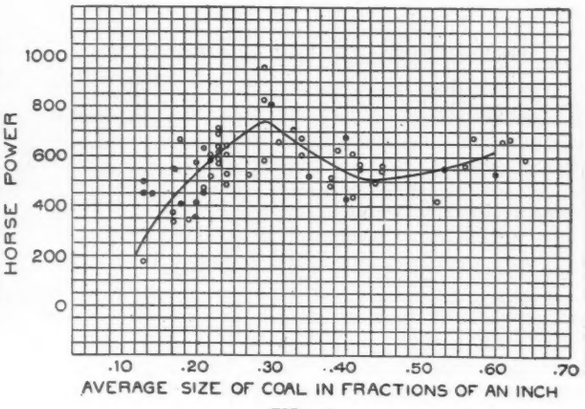


FIG. 4.

This lowering of temperature, besides making a long, smoky flame which reaches up among the boiler tubes and is there chilled to below the burning point, also reacts on the fuel bed, reducing the rate of combustion and still further increasing the adulteration of the furnace gases with free air. When the temperature of the furnace has been thus reduced to about 600 deg. F. the boiler is unable to absorb any more heat than is necessary to make up for radiation losses.

It will be observed that the points on the diagram do not fall in symmetrical order. This is particularly true of ash percentages of about 34, which may be explained by the refuse used in these tests being probably of a more fusible character than with others. These tests with the ash composition were made with the smaller boiler above mentioned.

In Illinois and Indiana, coal not sold as mine run is separated largely as lump and screenings, and such screenings furnish about 90 per cent. of the stoker fuel used in Illinois. Fig. 4 illustrates the result of 62 tests. The size of coal as measured by screens with square openings ranging in dimensions from 0.25 to 1.50 in. Fig. 4 shows the effect produced on horse-power output owing to this variation in size of the coal. The curve for capacity drops midway between the tests with both small and large coal. This is a peculiarity which may be explained as follows: Performance becomes better as the size of coal increases, until a point is reached when the quantity of large pieces becomes so great that there is not enough fine material to close properly the interstices between, with the result that performance drops off, due to excess of air, until a condition is reached when all of the pieces of fuel approach uniformity, when, owing to greater agreement in size, they fit together better, and in a measure produce a homogeneous mass similar to that secured by the fine dust filling the spaces in the fuel bed in the first case.

The presence of fine dust in excess is a great and important source of trouble. Referring to Fig. 2, coal through a 0.25 in. square screen produced only 108 h.p., yet a size of fuel known in Illinois as No. 5 washed coal, which will pass through a 0.25 in. round hole (a smaller aperture than the square opening) will produce as high as 600 h.p. under the same boiler. It is true that the lower ash content of the washed coal has a considerable influence, but this is offset by the larger size of the square screen as against the round one.

The character of results obtained is much influenced by the thickness of the fire. An excess of air accompanies a thin fire, and for this reason the efficiency produced through the boiler is affected. On the other hand, a thick fire reduces the excess of air, but increases the volume of hydrocarbon gases which leave the surface, or in other words, make more smoke. If a furnace is located between the boiler and stoker, these gases will be burned, otherwise they will largely escape among the tubes of the boiler as they did in this case. Therefore, under these conditions, a thin fire increases the loss due to excess of air, but decreases that due to smoke and incomplete combustion. On the other hand, a thick fire reduces the excess of air, but increases the smoke and escaping combustible gas, and so the best thickness of fire may be a matter of importance. With an ideal boiler the final temperature would be the same as the atmosphere, therefore an unlimited excess of air could be used without causing heat loss.

The value of coal screenings is affected by four variables, which are heating power, moisture, ash and size of the pieces of coal. Heating power in Illinois and Indiana of the coal free from ash and moisture ranges from 13,800 as the minimum to a maximum of 14,500 B.t.u. per lb. and moisture from about 9 to 14 per cent. These two characteristics, however, are of minimum importance, as either can affect the result by only a comparatively small amount. With the other two features, amount of ash and size of the pieces, each may exert an influence of such moment that they may cause the fuel to be valueless.

From the experiments performed it is proved that the resulting capacity and efficiency are approximately the same, and that the condition of fuel which results in a high efficiency also produces large capacity. This makes it possible to assign two values to the fuel, one applying to ash content, the other to its size, each of these values embracing efficiency and capacity as a unit.

In coal inspection service, it is quite essential that the tests be simple and few in number, but determination of the average size requires that several screens be employed involving a large amount of work, as well as difficult calculation, and for this reason there is great advantage in using but one screen, the 0.25 in. size having received more or less favorable consideration.

During the year 1905 there was produced in Illinois and Indiana about 50,000,000 tons of coal, 48 per cent. of which was 1¼ in. screenings, and although it was not in every case separated from the

lump, we can truthfully say that this 48 per cent., or 20,000,000 tons of screenings, was sold at the mine at an average price not to exceed two-thirds of its cost of production and this same fine coal was used for making steam at an average efficiency of less than 50 per cent. These two facts are sufficient warrant for further investigation of this little known subject.

Improved Dampers for Coke-Oven Flues.*

BY WILLIAM ARCHER.

The two dampers described in this paper are especially intended for use in the main flues conveying waste gases from coke ovens and steam boilers to the chimney or stack.

I—This damper (Figs. 1, 2 and 3) consists of a cast-iron solid-backed frame, *A*, constructed to hold a suitable number of square or rectangular lumps, *B*, of similar size and thickness, made of fire-clay or any other refractory material. The frame is open at the top and is provided with flanges at the bottom *a* and the sides *b*. The side flanges *b* are arranged with half-bulb shaped projections on the inner side, and the bottom flange *a* is flat. For use in large flues, the frame is fitted with two intermediate ribs *c*, extending from the top to the bottom, of the same hight as the side flanges *b*, and provided with bulb-shaped heads.

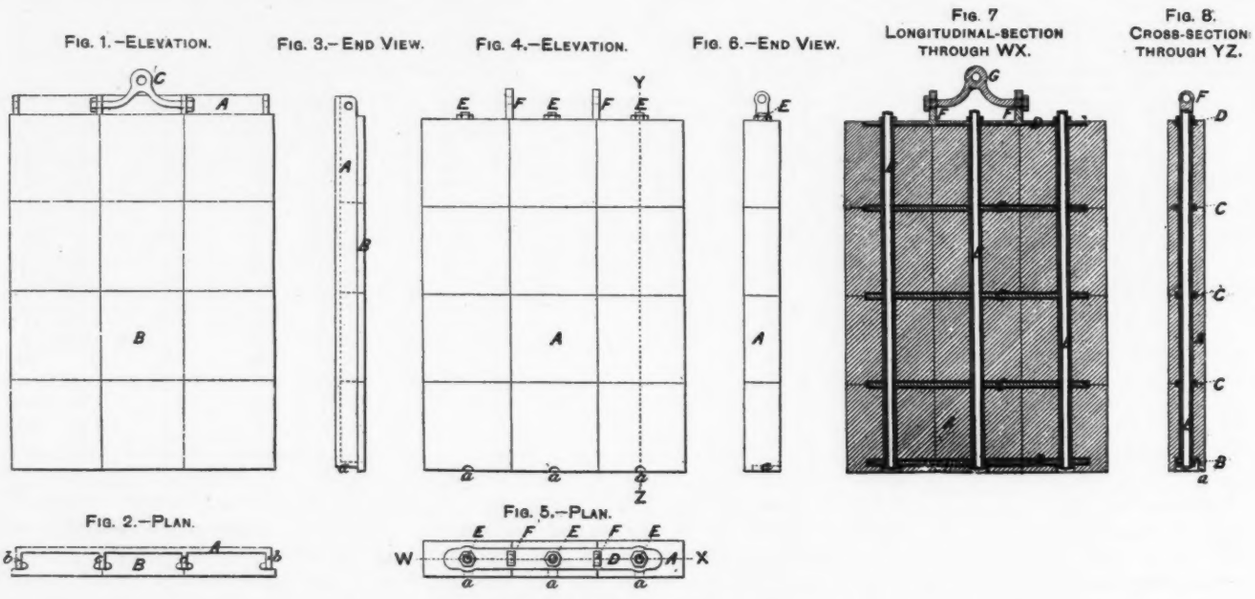
Holes are provided at the upper ends of the side flanges *b* and of the ribs *c*, for the insertion of the eye-piece or brindle *C*, used for lifting and lowering the damper.

The lumps *B* of refractory material are suitably shaped and fitted between the side flanges *b* and the ribs *c* and are inserted from the top downward. The lumps are made thicker than the width of the ribs and flanges and are joined together over the bulbs *c*, so that the metal is not directly exposed to the hot gases in the flues. The edges of the side lumps project over the side flanges *b*, and the bottom edges of the lowest lumps also project beyond the bottom flanges *a*.

The lower edges of all of the lumps are made of the same shape as the bottom edges of the lowest lumps; and if a bottom lump is broken, it is taken out and the one above falls into its place, another lump being put on at the top of the damper. The top edge of each lump is shaped so as to fit the bottom edge of the upper lump.

When in place in the flue, the cast-iron frame of the damper faces the stack or chimney. The frame, with its ribs, and size and number of lumps, can be arranged so as to suit any special requirements.

*Abstract of paper in *Transactions* of the North of England Institute of Mining and Mechanical Engineers, August, 1906.



II—This damper (Figs. 4, 5, 6, 7 and 8) is composed of a number of square or rectangular lumps *A* of similar size and thickness, made of fire-clay or other refractory material. For use in large flues, the damper may be built up of several rows of lumps *A*, with three or more lumps in each row. In the lowest row of lumps, a recess is provided of suitable depths in the bottom surface, but the recess does not extend to the outer edges of the two outer lumps. A flat bar of iron or steel *B* is fitted in this recess, and flat bars *C* of similar size are also fitted in the horizontal joint-faces of the lumps, the upper and lower faces of the joints both being recessed for the bars. A similar bar *D* is also let into the upper surface of the top row of lumps. A vertical metallic tube *E* passes from top to bottom through the middle of each of the three or more vertical sets of lumps and through the bars *B*, *C* and *D*. The ends of the tube *E*, which pass through the bottom and top bars *B* and *D*, are screwed and provided with nuts, and, when the latter are tightened, the tubes in conjunction with the horizontal bars fasten and key all the lumps firmly together.

One or more eye-pieces *G*, by means of which the damper can be lifted or lowered, are fixed to the brackets *F* and the top bar *D*.

In order that there may be a free circulation of air through the tubes *E* so as to keep them cool, holes or openings, *a*, are provided on the chimney or stack side of the damper, opening into the recess in the under side of the bottom row of lumps.

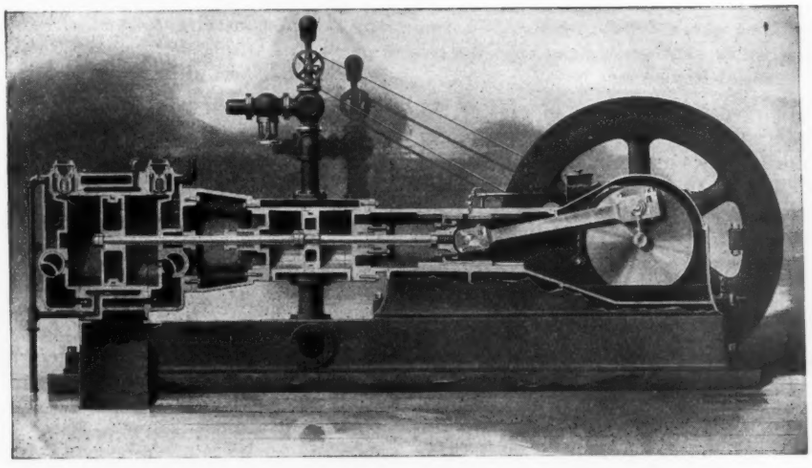
In this form of damper, no metallic part is exposed directly to the hot gases in the flue. I have had considerable experience in the use of various kinds of dampers of different forms, and have not found any so durable as those described in this paper. Both of them are efficient and maintain their rigid form, making a complete movable stopping, with the result that practically all of the gases from the coke ovens are available for heating the boilers. The dampers have withstood temperatures varying from 1400 to 2100 deg. Fahrenheit.

The pressure on the interior of the earth increases a little more than in proportion to the depth below surface, owing to the increasing density. The rock pressure at a depth of 1 mile is estimated at 6000 lb. per sq.in., and at the center of the earth at 45,000,000 lb. per sq.in. At 50 miles depth, where the temperature is above the melting point of platinum, the pressure is about 330,000 lb. per sq.in.—sufficient to hold materials solid, even at such exalted temperatures.

A New Air Compressor.

The accompanying engravings illustrate a new type of air compressor, particularly suited to industrial service, in railway and machine shops, foundries and large buildings, as well as to the general purposes of contracting, mining and quarrying.

This machine is of the duplex pattern, and is built in several combinations of steam and air cylinders, also for belt and power drive. The dominant feature is the box frame, with housing, which forms a tight enclosure about the crank disks, main bearings, eccentrics, connecting rods and crossheads. This housing excludes dust and dirt, and permits the use of a system of self-lubrication of the principal working parts. As shown in the sectional view, an oil well is provided in each frame, in which the edges of the crank disk are immersed. The oil clinging to the disks is removed by scrapers in contact with their upper edges, and thence conveyed to the main journals, crank pins, eccentrics and crosshead guides, being finally returned to the well by gravity to be used again. These machines require the minimum of attention, as it is necessary to add oil to the wells only at long intervals.



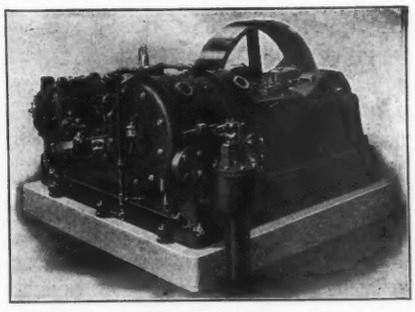
SECTIONAL VIEW.

These compressors are compactly and substantially built. All sizes except the largest are mounted on a heavy sub-base, in which the intercooler and steam reheater (on cross-compound machines) are situated. The frames are of the tangye pattern, with long bearings on the base, securing rigidity and maintenance of correct alinement of working parts. The steam valve-gear is controlled by a Meyer adjustable cut-off, the throttle being regulated by a sensitive steam and air governor.

The air cylinders are not cored out, but, instead, separate liners are forced into the castings, thus precluding shrinkage strains. The space between the liner and the cylinder forms the water-jacket, and outside of this again is the air inlet passage. Incoming air is thus admitted to the cylinder without contact with heated walls.

The air-cylinder heads are also water-jacketed, and in two stage compressors an efficient intercooler is provided, consisting of a nest of cold-water tubes, made of copper, with whose cold surfaces the air is forced to come into intimate contact in passing from the low- to the high-pressure cylinder.

The inlet valves on all air cylinders are of the semi-rotary or Corliss type, and are moved by steel valve stems, connected by adjustable connecting rods to independent eccentrics on the engine shaft. The moving parts start from and arrive at the ends of their travel with a slow and easy motion, but at the points of opening and closing of the valves, these parts attain their greatest speed; it is thus possible for the valves to remain open during the entire stroke, allowing the cylinder to fill with air at barometric pressure, and trapping it instantly before the piston begins its return.



GENERAL VIEW.

The valves themselves are made of close-grained semi-steel, of large diameter, fitted with accuracy. Provision is made to permit a thin film of air to get behind the closed valve, pressing the cutting edges to the seat, and making the valve tight against leakage. The valve stems have T-shaped heads on their inner ends, carefully fitted to the slots in the ends of the valves. The attachment is such that the valves are free to follow up wear automatically without hindrance from the stems. These valves may be removed through the back bonnets without disturbing the setting of the valve gear. This valve gear is simple, strong and durable, is positive and reliable in action, and insures high volume efficiency.

The discharge valves are placed radially on top of the cylinder-head castings. They are set with removable seats in shallow ports or pockets as shown in the sectional view of the class W E machine referred to above, at a sufficient distance from the ends of the cylinder so that the piston travels completely past the openings to these pockets, at each end of the stroke, thereby reducing clearance to the smallest amount possible. These valves are of the poppet type, internally guided on cast-iron plugs and held to their seats by light steel springs. They are seated in bronze cages, readily removable by unscrewing the valve plug. As shown by the sectional view, they are completely surrounded by water-jackets, in order to reduce the temperature of the air at its terminal pressure.

These air compressors are built in capacities ranging from 100 to 2600 cu.ft. of free air per minute. They are made by the Sullivan Machinery Company, of Chicago, which has erected large additions to its works at Claremont, N. H., for the manufacture of this type of compressor.

The Storage of Coal by Submergence.

The recent discussion favoring the storage of coal by submergence under water and showing the advantages of so doing, has been acted upon by the Western Electric Company at its new plant west of Chicago. This company has constructed 12 pits, the walls of which are made of cement. Each pit or bin is about 80 ft. in length and 25 ft. wide, with a depth of about 16 ft. They lie in one solid block, three in a row, counting side by side, or four in a row end to end. The rectangular space occupied is thus about 320 ft. in length by 75 ft. in width. Longitudinally the division walls are wide enough for a railroad track, two of which thus run lengthwise through the storage yard, so that the coal from the cars can be dumped into the bins beneath on either side. And under these tracks is built a series of arches in the separating walls, eight for each bin, thereby connecting the bins. The separating concrete walls at the ends are about 18 in. in width.

The bottom of the pits consists of clay soil. A 12-in. water pipe opens to the vats near the top, so that the coal can be readily flooded with water when necessary. The tops of the pits rise about 4 ft. above the natural level of the ground. For the purpose of reloading the coal, a steam shovel will be used. The storage capacity of the pits is estimated at 14,000 tons.

Colliery Notes.

In the coal mines of the United States, seven lives are lost by falls of roof to one by an explosion.

In a fiery mine, it is dangerous to allow a miner to drive his working place more than 60 ft. beyond the last crosscut unless a brattice is built and the air thus carried to the face.

In the cylinders of a compressed-air locomotive, only a low cold-test oil should be used. The oil should show a gravity of about 29, and a cold test of —5 deg. Fahrenheit.

For every animal in a mine, at least 600 cu.ft. of air per minute must be allowed in calculating the necessary total quantity. A miner requires at least 100 cu.ft. per minute.

Compressed-air locomotives are built to run one-half to three miles without being recharged. This distance can be doubled if storage tanks are carried on the tender. The time required for recharging is about 1¼ minutes.

Powder should never be taken into mines in cars propelled by electricity. In case of a wreck, the live wires are liable to come in contact with and set off the powder. In all cases the utmost care must be experienced in carrying powder to the faces.

Where compressed air is carried through pipes into the mine, it should be remembered that in case of fire these pipes can be utilized to carry water into the mine. Also in case of an explosion it is sometimes possible for the men to secure air through the pipes.

Miners should always keep their powder or other explosives in a wooden or metallic box, securely locked. These boxes should be at least 10 ft. from the track, and not nearer together than 60 ft. Never put black powder and high explosives in the same box.

No miner should ever be allowed to use an iron or steel-pointed needle in the process of charging and tamping a hole. The tamping bar should have at least a 5-in. copper tip and the needle used in preparing a blast is most satisfactory when made entirely of copper. In tamping the hole some soft material must always be placed next to the cartridge or explosive.

A fan may be easily pulling and discharging the quantity of air required by law; but this does not necessarily mean that a proper amount of air is circulating through all the splits. A number of readings at the entry faces of the mines in one district showed that, on an average, less than 70 per cent. of the air sent into the mine reached the faces where the men worked.

A simple plan for securing braking action on a car traveling on an inclined road consists in removing the rail on one side, and substituting in its place a plate upon which the flange of the wheel rolls, so that while one wheel on the same axle rolls upon the tread, the other wheel rolls upon the larger diameter flange. It is essential in such an arrangement that both wheels are fixed to the axle, and a check rail provided to guide the car.

An easy way of determining the coefficient of friction of a mine car is to place it on a level road and to pull the car along by means of a small spring balance, similar to an ice scale, recording the pull necessary to keep the car moving. Then if we divide the number of pounds pull thus shown by the gross weight of the car, the resulting quotient will give the coefficient of friction. For general purposes the coefficient of friction may be taken as 0.03.

In placing mine props to support the roof, care must be taken to locate them with reference to the track, so that a mine car leaving the rails will not knock them down and allow the roof to cave in. During the past year several accidents have occurred where mine cars have been derailed, and, bumping props, have knocked them down and allowed the roof to crush the miner. This is one of the principal reasons why it pays to drive haulage ways narrow, and use little or no timbering in them.

In compressed-air haulage no serious difficulty from freezing in the exhaust passages of the locomotive will be encountered if high pressures are used. Only in case of low pressure will freezing occur. Where higher pressure is used, practically all of the moisture is squeezed out of the air in the process of compression and deposited in the stationary storage, or in the tanks on the locomotive, whence it can be drawn off at intervals. The only other cause of freezing may be the use of a poor quality of oil.

In order to determine the effect of frost upon an unknown stone which is intended to be used for building purposes, the stone should be washed, dried, and then weighed. The samples should then be moistened and afterward exposed to alternate freezing and thawing; after this the stones should be washed, dried, and weighed again. The loss in weight measures the relative durability. A much quicker way of accomplishing the same result is to heat the specimens to 500 deg. F. and plunge them while hot into cold water. The ratio of loss in weight shows the relative resistance to action of frost and freezing.

As to the grades on which mine cars will run by gravity, there can be no fixed rule, because of the various conditions in which mine cars are found. Sometimes they are well lubricated and in good shape, while at other times these important duties are neglected, and much friction results. Experience has proved that under good conditions and after a car is already in motion, a grade of 0.7 per cent. will be sufficient to keep the car moving. If, however, the incline must be one where the car will start from a standstill, the grade in this case must be about 4 per cent. A grade equal to this is also necessary if the cars are to pass around curves of short radii.

A miner is generally employed by piece work, or is paid by the ton for the coal mined; this being the case, anything which takes him from his real work is looked upon as lost time. Operators understanding this fact should see that the timber sent into the mines is of the proper length and ready for use. If the timber is too long and the miner has to spend ten or fifteen minutes setting the prop, he is likely to neglect this part of his work, and trouble may ensue. The lid, or cap, is almost as important as the prop, for the latter only grips the roof to the extent of the size of the cap. Generally speaking, caps which are intended for one prop only should be about 2 ft. long, 8 in. wide and 3 in. thick.

At mine haulage plants where several electric locomotives are used, much trouble and delay is often caused by the frequent "blowing" of the circuit breakers when the generator is called upon to deliver a current beyond its safe capacity. The service is sometimes repeatedly interrupted, which is due to the improper use of the controller in the hands of the motorman. As soon as the circuit breaker is reset by the engineer at the power house, all of the locomotives are simultaneously started, and as each motor requires a comparatively large current when starting, this often aggravates the trouble, and sometimes delays haulage for a half hour. Motormen should start cautiously, and not immediately after the circuit breaker is reset.

No large company would think of employing a machinist who had never served his apprenticeship. Why is it then that mining companies will import inexperienced laborers, and expect them to perform intelligently the duties of a miner? Scarcity of labor is hardly an excuse, nor can any arguments be advanced that will justify or lessen the crime involved in such action. Mining statistics taken from the bituminous fields of Pennsylvania show that out of 536 accidents in 1904 there were 227, or 42 per cent., due to carelessness or ignorance on the part of the victims. Three per cent. were due to carelessness of other persons, and 104, or 20 per cent., were reported as unavoidable. Certainly to avoid such accidents, it is not only necessary to educate the miner, but to see positively that every man employed as a miner has served his apprenticeship and is capable of acting on his own responsibility as a miner. In effecting this end, the miners' union can be more powerful than the operator.

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Fomenting Trouble in Mexico.

The sensational articles and news reports which have appeared recently in the daily press to the effect that serious internal trouble is brewing in Mexico and that an outbreak against the Americans there is to take place on Sept. 16, the national holiday, have generally been regarded as so absurd as to be unworthy of special attention, the lurid headlines, like "The Mexican Border Aflame," being sized up simply as preposterous falsehoods; but when a journal of the standing of *Harpers' Weekly* features on its front cover an article on "The War Peril on the Mexican Border," the matter has reached a stage requiring earnest condemnation. The article in question, which is signed by Broughton Brandenburg, reads like a journalistic "write-up," in which the internal politics of Mexico are discussed in a superficial and more or less inaccurate manner, but with sufficient plausibility to impress the less informed that some inside information is being communicated. There are, however, sufficient obvious misstatements of facts, beginning with the opening words of the article, viz.: "The long list of outrages, anti-American riots, assassinations of Americans in Mexico, and demonstrations connived at by secret anti-American societies," followed by an erroneous account of the recent troubles at Cananea, to betray ignorance of the author as to his subject. Naturally, this article has aroused a storm of protest in Mexico among the Americans residing there, who understand its misrepresentation of the conditions.

There is no long list of outrages, riots, etc., against Americans in Mexico. The Americans in Mexico, at least those who have behaved themselves and have had decent regard for the laws, customs and prejudices of the people among whom they have been living, have been treated by the Mexicans and the Mexican Government with the highest kind of appreciative consideration. They have been supported honorably in their rights, and have suffered from assassination and other dangers no more than in our own country at an equal stage of development. There was no pitched battle at Cananea, and no heavy loss of life. The American Government did not rush four troops of cavalry from "Fort Huchuco" (the author meaning Fort Huachuca) to the border and hold them there, but on the contrary immediately ordered them back, the original action having been taken by the major of the squadron on his own responsibility.

However, there appears indeed to be an effort by an insignificant Mexican *junta* in this country to stir up trouble in Mexico, in which it is hoped possibly to embroil the United States. In no other way can we account for the persistent propaganda through the American press. Naturally, every little happening which could possibly be made use of to further the purposes of the conspirators, has been taken advantage of. Ordinarily such incidents would not receive anything more than local attention, and most of the reports concerning them, which have been published, have been either untrue or grossly exaggerated. In a report by Hon. David E. Thompson, the American ambassador at the city of Mexico, made public by the State Department on Sept. 7, the reports of a bitter anti-American feeling in that Republic and an organized revolution against President Diaz, which have been made so much of in some of the daily papers, are characterized as utterly false, the few troubles that have occurred having been nothing more than small labor riots.

The mischief of these false reports is that they create a feeling of unrest among both the Mexicans and the foreigners who are residing with them. The lower class of Mexicans have possibly been excited to ideas, which previously never would have occurred to them, of what might be done along the lines discussed in the publications. If this disquiet is allowed to continue, the large mining and other interests which Americans have in Mexico will surely be adversely affected, and the persistency with which some American journals have agitated the prospect of trouble on the border and in Mexico cannot too strongly be condemned.

We do not expect to hear of any serious trouble in Mexico on Sept. 16, although if there be not some local disturbances the fact will speak marvelously well for the confidence in the Mexican Government and the sobriety of the Mexican people. Such a thing as a general rising is not to be seriously considered. If there should be any local disturbances, for which American papers will be largely responsible, they will be handled rightly by the Mexican Government. Those who are promoting the idea that enemies of Presi-

dent Diaz can force the United States to enter Mexico to protect her citizens, appear to overlook the strong arm of the Mexican Government, and its excellent ability to preserve order, as was manifested by the promptness with which the riot at remote Cananea was stopped.

American Smelting and Refining Company.

The seventh annual report of this company, an abstract of which is published elsewhere, is a gratifying statement, although its figures are not given in such a way as to permit analysis. However, the important point is that the net earnings of the company, after writing off from the gross earnings the expenses for repairs and renewals and all new construction, purchases of additional plants, etc., amounted to $8,774,055, which was a gain of 11.5 per cent. over the previous year. After paying dividends $750,000 in excess of 1905, the surplus for the year amounted to $2,024,055 against $1,618,912 for the year ended April 30, 1905.

It is pleasant to observe the official statement that the increase in the earnings was in no way due to any raise of treatment charges on ores bought from the miners, which on the contrary have been in many instances decreased. This manifests a broad policy on the part of the directors of the American Smelting and Refining Company, and a recognition of the principle that its interests are indissolubly connected with those of the miners. The earnings of the company are derived chiefly from its treatment charges, representing the difference between the actual cost of smelting and the amount charged the sellers of the ore for that work. Consequently, it is to the interest of the company to stimulate the production of ore to the best of its ability, and in the present condition of the markets for the metals there is apparently no limit to be imposed, except the smelting capacity of the company, and that is rapidly being increased. It is now plainly stated to be the policy of the company to reduce treatment charges wherever that can be done with the assurance that a reasonable profit to the company will continue, the company looking toward further economies in operating expense and the development of new mines for the increase in earnings which naturally it expects. This is certainly a broad and far-seeing policy, which will inevitably result to the advantage of both parties concerned. The recent reduction in the Colorado schedules is the best kind of evidence to the miners that the company means what it says.

At the present time the American Smelting and Refining Company is in a very strong financial position, and the prospects are that its earnings for the current year will greatly surpass those of last year, and thus further continue the unbroken record of increased earnings shown yearly since the organization of the company, to which the directors call attention in their seventh report. The company has a greatly increased stock of metals on hand, on which the market prices, especially for copper, have risen materially since the date of the last report, with strong prospects that the increases will be held during the remainder of the year, while, moreover, the earnings of the American Smelters Securities Company, of which many of the large properties were still in the development and construction stage during the last fiscal year, will greatly increase during the present year. Furthermore, the mining properties of the American Smelting and Refining Company will begin this year to furnish an income applicable to the payment of dividends. The policy of the company in deferring the earnings of its subsidiary companies from the profit and loss account until the plans in connection with them could be completely worked out has been conservative. It is to be expected that during the current year the stockholders in the parent company will begin to reap the benefits of the extensions of its interests which the directors have made during the last two years.

Electric Drills vs. Air Drills.

The communication from Mr. Barnes, published elsewhere, on the relative merits of various electric drills, is a valuable contribution to the discussion of this subject, which was opened by Mr. Palmer in an article published in the JOURNAL of Aug. 18. Both of these articles are of the eminently practical character which leads the way to valuable conclusions, and they display diametrically opposite opinions. Mr. Palmer thinks that the difficulties presented in the design of electric percussion drills are insurmountable; while Mr. Barnes believes that the time is not far distant when improved construction will cause the electric drill to be acknowledged the equal, if not the superior, of the air drill. Obviously a further discussion of the subject, illuminated by the experiences of other engineers, is necessary to reconcile such divergent conclusions.

The air drills of a mine are large consumers of power. Each 3¼-in. drill working at 70 lb. pressure has been found to consume about 12.5 h.p., even when the installation of air-transmission pipes is above the average in character. The loss of power in compressed air transmission is large, and electrical transmission was early seized upon as offering the prospect of effecting great economy in this respect. However, we must admit that Mr. Palmer is correct in stating that, up to the present time, that hope has not been realized, at least in so far as a general adoption of electric drills is concerned. It is now 16 years since the Vandepoele and Marvin drills were brought out, and although greatly improved machines have since been designed by other inventors, certainly they have not yet made any serious inroad on the field of the air drill. Nevertheless, electric drills have been used successfully in many mines, and in some mines, as Mr. Barnes moderately points out, they are employed to advantage. We hope that our readers will contribute the results of other experience pertaining to this important subject.

The International Geological Congress.

The International Geological Congress, which opened its tenth annual meeting at the City of Mexico, Sept. 6, is very well attended and promises to be a highly noteworthy meeting, as it could hardly fail to be in view of the interesting mining districts which are to be visited by the members before they disperse. Señor José de Aguilar, a director of the Geological Institute of Mexico, was chosen president of the Congress, among the vice-presidents being Angelo Heilprin, S. F. Emmons and T. C. Chamberlain, of the United States. The United States is very well represented at the meeting, as is fitting in view of our intimate connections with Mexico, a large number of well known American geologists being present. This meeting is an event that has been looked forward to by geologists with pleasant anticipation for a long time. It promises to be all that was expected.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Air Drills vs. Electric Drills.

Sir—Since reading the article by Granville E. Palmer in the JOURNAL of August 18 on the subject of the relative merits of electric and compressed air drills, it has occurred to me that the experiences and opinions of another in the same line might be of interest to your readers as throwing some additional light on this very important question.

A study of nearly all the electrically operated drills now on the market has led to certain general classifications as to types of construction and adaptability to certain classes of work as met with in mining operations, to which the observations noted have been chiefly confined.

Electrically operated drills may be classed as: (1) Those having the motor mounted on the drill body, such as the Adams, Box and Gardner; (2) those having the motor at a distance and connected by flexible shaft or other means, as for instance the Durkee and Temple; and (3) those operated by the direct action of a solenoid on the plunger or hammer, of which the Marvin is probably the best known example.

Of those named in the first two classes the Adams, Gardner, and Durkee transmit the force of the blow through springs, a construction which seems inherently inclined to give trouble in a machine subjected constantly to such violent shock and vibration as is met with by a rock drill. The Durkee has the further disadvantage of a connection by flexible shaft between the motor and drill proper, which naturally renders the drill quite unfit for any work except tunneling and drifting, as the motor is too large to be handled readily in a stope or raise.

The Box and the Temple drills operate on a very different plan, and one which does away at once with all the above named objections, namely the transmission of the power from the motor to the hammer or piston through an air cushion. In the Box drill a cylinder surrounding the hammer proper is reciprocated by a small motor mounted directly on the drill body, and the power is transmitted by means of the air trapped between the ends of the cylinder and the piston, producing a perfectly flexible connection and one which assures that the motor shall not be stalled by the drill sticking in the hole. The drill is light and compact, weighing, I believe, only 140 lb. for the small or stoping size, and about double that for the larger size, said to be equivalent to a 2½- or 3-in. air drill. I have timed the operation of a Box drill in hard granite, and found it to drill a 2-in. hole from 2 to 3 inches per minute with a power expenditure of approximately 1½ h.p.

The Temple drill has proved quite satisfactory in the Leadville district, being used in the largest tunneling operations, in which line it has done some remarkable work as is shown by the figures given below. In this machine the drill proper consists of a stationary cylinder with a piston and mechanism for revolving the steel similar to the ordinary air drill. The cylinder is connected at either end by means of a 1½-in. rubber hose some 12 ft. long, with the double cylinder pump or compressor operated by the electric motor. The pump cranks are set 180 deg. apart and no valves are used, the alternating suction and compression of the air in the connecting hose being transmitted direct to the drill piston, which operates in exact synchronism with the pump. This construction enables a terrific force to be applied to the steel with absolutely no vibration transmitted back to the motor, which is mounted on a small truck and may be easily rolled back out of the way when shooting or mucking.

In drilling a round of holes in a breast of iron and zinc sulphide the following figures were obtained in a test case recently made on a Temple 5A drill, the men working at ordinary rate and not under any forced speed:

Hole No. 1.	Cutting Speed.	Power.
1st steel.	4½ in. per min.	4 h.p.
2d steel,	7 in. per min.	3½ h.p.
3d steel.	8 in. per min.	4 h.p.
4th steel, 7 ft. long.	7 in. per min.	4 h.p.

The drill ran at a speed of 400 strokes per minute, and the total elapsed time for drilling a 5-ft. hole was 25 minutes. The drill stuck several times in this hole on account of steel being under gage. In hole No. 3 no sticking was experienced, and a 5-ft. 4-in. hole 2 in. in diameter was drilled in exactly 15 minutes elapsed time, this including changing steel three times. At one time a cutting speed of 10 in. a minute was maintained for nearly two minutes, until the feed screw reached the limit of its travel.

This drill works to best advantage in hard ground and is used extensively in the Yak tunnel in Leadville, where, working hard blue limestone, it has several times drilled three 5-ft. holes in one hour, and the usual time for setting up, drilling and shooting a round of 5-ft. holes is from five to six hours. The drill runners like the machine, which is quite a point in its favor, about the only objection they make to it being the fact that it occasionally bends the drill steel by the force of the blow.

The Marvin drill, while probably the best theoretically, has several practical drawbacks, among which are greater comparative weight and the enforced use of a special type of generator, which, operating at its low voltage, must necessarily be within a comparatively short distance of the drills, a transmission of over half a mile being attended by a rather heavy investment for wires. Where they can be handled, the Marvins do excellent work on account of their extreme simplicity and have proved quite popular for stone-quarry work.

In my opinion there is as yet no electric drill able to compete with the small air drills. The Box is probably the most practical now on the market for light mining, and, when given reasonably careful handling, will do good work. The personal factor enters more into the operation of electric drills than anywhere else, the careful operator being the chief necessity for successful work; unfortunately, however, he is extremely hard to find.

For tunneling and drifting in hard ground the Temple will hold its own with any air drill, and where transmission and cost of power must be considered, it has great advantages. The drill in the tunnel referred to above is now operating over four miles from the power house and is using an average of less than 5 h.p. As is well known, the transmission of a sufficient volume of air to operate a 3- or 3½-in. drill over this distance would be attended with considerable loss as well as a greater first cost, the electric drill in this case being simply attached to an extension of the trolley wire used by the haulage system.

It would seem, therefore, that while the air drill is still supreme in many cases, yet the electric is pushing it hard in others, and I fully believe that the time is not far distant when improved construction will cause the electric to be acknowledged the equal if not the superior of its predecessor.

H. B. BARNES.

Leadville, Colo., Aug. 29, 1906.

Jonathan's Message.

BY R. W. RAYMOND.

At the banquet of the Iron and Steel Institute, which took place in October, 1890, at New York, it was my privilege to offer, as a part of my address, some verses, entitled "Uncle Sam's Welcome," which had the good fortune to win from our English guests a flattering approval; and the president of that society, in notifying me of my appointment as a speaker at the great dinner in the Guild Hall of London, on the 27th of last month, paid me the compliment of requesting that I would include in my remarks something more of the same kind. Experts in after-dinner oratory need not be told that such a request is highly embarrassing. If a man has had good luck once in a given line, it is, of course, best for him to try some other line next time. Nevertheless, in the goodness of my heart (whatever might be the inference as to my head),

I resolved to do my best to satisfy the desire of my friend Hadfield, in recognition of whose services and merits I was ready, if necessary, to sacrifice my reputation; and consequently I delivered in London the verses which are printed below. In further explanation, I may add, that, in the immediately preceding part of my speech, I had emphasized the unquestionable historic fact that the war of the American Revolution was a conflict, not between England and America, but between the party of freedom and the party of despotism in both countries; that the best men of England were on our side; that the general refusal of Englishmen to enlist (even at double pay) in a war against men of their own blood necessitated the employment in that war of European mercenaries; and that the final victory won by the party of freedom in America was only the prelude to a similar victory of the same party in England. In the light of such an introduction, the following verses should be interpreted.

SEZ JONATHAN.

Now don't tell me the British Oak
Was *split* by any lightnin' stroke!
Bless your soft head, that wa'n't a *split*,
But just a *fork*, that doubled it!
For Freedom ain't no sapling slim
A-feared to grow another limb;
Thar's two big branches to *that* tree,
An' one is *you*, an' one is *me*,
Sez Jonathan, sez he!

Your bough's the biggest up to date;
But mine has struck a lively gait,
An' fust you know, she'll shove her way
Right alongside o' yourn some day,
While through 'em both, from foot to cap,
Tingles an' climbs the same old sap!
No matter whar them branches be,
Thar ain't but one trunk to that tree,
Sez Jonathan, sez he!

What's more, we're both a branchin' yet,
With every blessed chance we get;
An' every limb that we send out
Is welcome to grow stanch and stout.
The sky above, the sile below,
Give room an' food for all to grow;
An' limbs an' leaves that flutter free
Just add more glory to the tree,
Sez Jonathan, sez he!

Grow on, O stalwart oak an' tall;
Spread wide thy branches, great an' small,
While in their shelter nest the birds,
And in their shadow stand the herds;
Lift all thy heads to greet the sun
Thet crowns with splendor every one—
So men, till men shall cease to be,
May praise and bless the ancient tree,
Sez Jonathan, *say We!*

The temperatures reached in the cylinder of a gas engine are not often realized. Dugald Clerk has determined a temperature as high as 2798 deg. F. on an engine of 40 lb. compression.

A lot of ammunition was recently found in a bucket which had been walled up in the roof of Durham Castle, England, probably having been placed there about 1641, when the castle was armed against a Scottish raid. The bullets consisted of roughly molded spheres of lead of two different sizes, some being 1.5 cm., and others 1.8 cm. in diameter. On analysis they were found to consist of 99.17 per cent. of lead, and to contain a small quantity of iron and silver, together with traces of bismuth, arsenic, and antimony.

New Publications.

"Stray Currents from Electric Railways." By Dr. Carl Michalke. Pp. 101; illustrated. 5½x8 in.; cloth, $1.50 net. New York, 1906: McGraw Publishing Company.

"Annual Report of the Commissioner of Mineral Statistics of Michigan." James L. Nankervis, Commissioner. Pp. 188; illustrated. 6x9½ in.; cloth. Houghton, Mich., 1906.

"The Cyanide Process." By Alfred S. Miller. Second Edition, Revised and Enlarged. Pp. 95; illustrated. 5x7½ in.; cloth. New York, 1906: John Wiley & Sons. Price, $1.

"Statistics of Manufactures, 1904, 1905." Massachusetts Bureau of Statistics of Labor, Chas. K. Pidgen, Chief. Pp. 84. 6x9 in.; paper. Boston, 1906: Wright & Potter Printing Co., State Printers.

"Water Softening and Treatment. Condensing Plant, Feed Pumps and Heaters for Steam Users and Manufacturers." By W. H. Booth. Pp. 308; illustrated. 5½ x8½ in.; cloth, $2.50 net. New York, 1906: D. Van Nostrand Company.

Contents: The treatment of water by softening, oil separation and filtration. Air pumps, condensers, and circulating pumps. Feed heating; stage heating. Water cooling. Feed pumps. Injectors.

"The American Steel Worker. A Twenty-Five Years' Experience in the Selection, Annealing, Working, Hardening and Tempering of Various Kinds and Grades of Steel." Second Edition. By E. R. Markham. Pp. 339; illustrated. 5½x8 in.; cloth, $2.50. New York, 1906: The Derry-Collard Company.

This is a treatise dealing especially with the cutting tools employed in machine-shop practice, which is based on the results of long practical experience. It is a useful book for machinists and others who are interested in the subject.

"The Analysis and Softening of Boiler Feed-Water." By Edmund Wehrenfennig, in collaboration with Fritz Wehrenfennig. Translated by D. W. Patterson. Second Edition, revised. Pp. 290; illustrated. 5½x9 in.; cloth, $4. New York, 1906: John Wiley & Sons.

Contents: Impurities in water. The analysis of water. Preparation of the necessary chemicals for water analysis. The improvement of water. Determination of the amounts of reagents. Testing the softening. The removal of precipitate from the treated water. The accomplishment of water purification and the separate arrangements employed therefor. Review of the development of water-purifying plants. Critical examination of water-purifying plants. Study concerning the installation of water-purifying plants. Report on water-softening by the Society of German Railway Managers. Method of tabulating data.

"Portland Cement, Its Composition, Raw Materials, Manufacture, Testing and Analysis." By Richard K. Meade. Pp. 385; illustrated, 5½x9 in.; cloth, $3.50. Easton, Penn., 1906: Chemical Publishing Company.

Contents: History of the development of the American portland cement industry. Chemical composition of portland cement. Raw materials. Proportioning the raw materials. Quarrying, excavating, drying and mixing the raw materials. Grinding the raw material and grinding machinery. Kilns and burning. Cooling and grinding the clinker, storing and packing the cement, etc. The analysis of cement. The analysis of cement mixtures, slurry, etc. The analysis of the raw materials. The inspection of cement. Specific gravity. Fineness. Time of setting. Tensile strength. Soundness. The detection of adulteration in portland cement. Trial burnings.

"Electric Transmission of Water Power." By Alton D. Adams. Pp. 335; illustrated. 6x9 in.; cloth, $3 net. New York, 1906: McGraw Publishing Company.

Contents: Water-power in electrical supply. Utility of water-power in electrical supply. Cost of conductors for electric-power transmission. Advantages of the continuous and alternating current. The physical limits of electric-power transmission. Development of water-power for electric stations. The location of electric water-power stations. Designs of electric water-power stations. Alternators for electrical transmission. Transformers in transmission systems. Switches, fuses and circuit-breakers. Regulation of transmitted power. Guard wires and lightning arresters. Electrical transmission under land and water. Materials for line conductors. Voltage and losses on transmission lines. Selection of transmission circuits. Pole lines for power transmission. Entries for electric transmission lines. Insulator pins. Insulators for transmission lines. Design of insulator pins for transmission lines. Steel towers.

A preparation which has been recommended for use in packing gasolene-engine cylinder joints is made by mixing graphite and kerosene in a thick paste, which is applied to both sides of sheet asbestos. This may also be used in packing pipe joints when carrying gasolene vapor.

The new Graduate School of Applied Science of Harvard University will begin its first year this fall. The income of $2,000,000 from the estate of Gordon McKay will be available for the purposes of the school, and this will be augmented later when the whole $4,000,000 or $5,000,000 of the estate shall have been received. The new school will not supplant the Lawrence Scientific School for the present, the opportunity remaining open to those students already enrolled in that department of the university to complete their courses.

The Bennetts-Jones Slag Car.

The Bennetts-Jones slag car, which has recently been brought out by the Allis-Chalmers Company, is intended to meet the demand for a simple, substantial slag car, having a capacity midway between the regulation hand pot and the large slag pot now common about modern smelting plants. It consists of an approximately rectangular scoop-shaped cast-iron bowl, mounted upon a turn-table, and arranged to discharge in any direction. The car is

FIG. 1

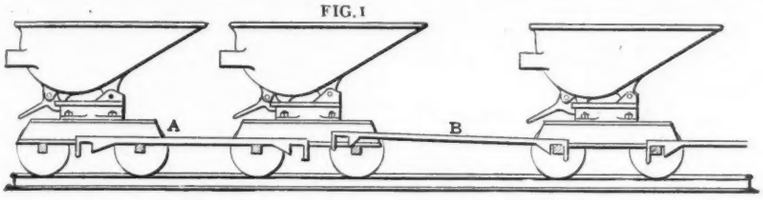
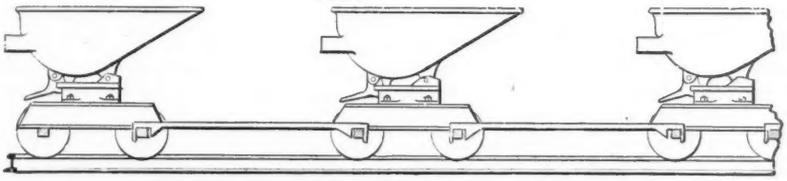


FIG. 2



usually designed for 18 in. gage, but can be made for any gage that is desired.

This car is in use at the plant of the Tacoma Smelting Company, where 60 of them have been in operation for the last two and a half years. At this plant it has been found that one man with an electric locomotive can haul 30 of these cars per hour a distance of 1000 to 1500 ft., and dump and return the cars to the furnace, which is equivalent to approximately 575 tons of slag handled per day.

The car throws its contents a considerable distance beyond the side of the track where discharged. When the slag has solidified, the cake is thrown at least 2 ft. beyond the ties, and by using pieces of old rails as skids the cakes can be thrown a distance of 18 to 20 ft. from the track. With slag in a molten condition, it is delivered a distance of 18 in. to 2 ft. from the edge of the track.

These cars are coupled in train by coupling bar, illustrated by Fig. 4, which consists of a flat bar of steel, which has formed at each end a double pocket that drops over the square portion of the axle of the car between the main frame pieces. In coupling up a train of cars these bars are simply laid over the axles as shown at *A* in Fig. 1. The locomotive then pulls slowly on the head car, and as each car moves forward the dumping bar drops automatically into place in the manner shown at *B*, the resulting train being connected as shown by Fig. 2. When the cars are run on a side track and the coupling bar is not in use, it is turned back upon the axles of the cars, as shown by Fig. 3.

The standard Bennetts-Jones car weighs 1600 lb., is mounted on 12-in. flanged wheels, and has a capacity of about 1600 lb. of slag. The hight from top of rail to top of bowl is 37 in.; extreme width of bowl, 3 ft.; extreme length, 4 ft. This car is the invention of B. H. Bennetts, superintendent of the Garfield Smelting Works, Salt Lake City, Utah, and L. W. Jones, superintendent of the Tacoma Smelting Company, of Tacoma, Wash.

FIG. 3

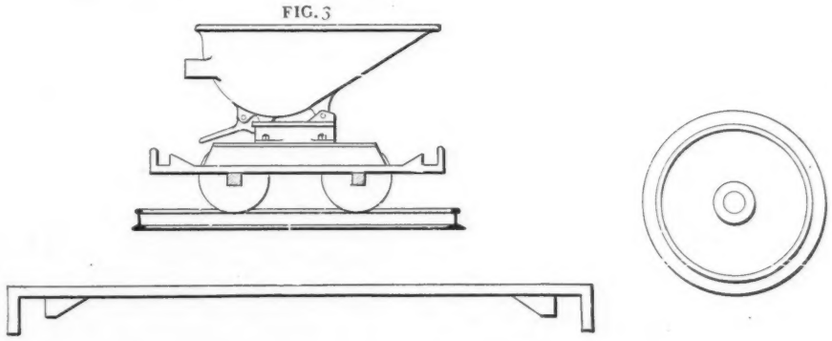
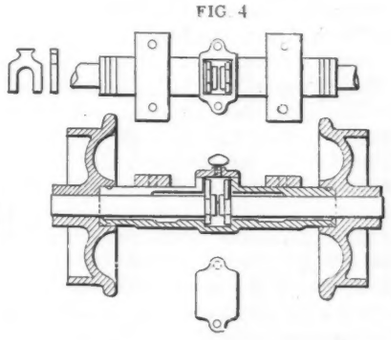


FIG. 4



The use of any considerable amount of magnesium in copper for sand casting is said to produce a mixture which is exceptionally "drossy," and more difficult to cast than the aluminum-bronzes. The oxidation of the magnesium when it is exposed to the air causes this difficulty. As the oxide of magnesium which is formed is very bulky, the amount of dross is correspondingly large.

Bidding for Gold.

The sudden rush of New York bankers into the London market recently to get gold for import marked a curious and unusual situation, says the New York *Evening Post*. One hears the question now and then, how and on what basis is gold bought and sold in London's market? How can gold have any but a fixed value, and how can one banker overbid another for it?

The fixed price of gold at the British Mint is 77s. 10½d. per oz., but there is nothing to prevent a private banker from bidding higher, if he chooses. He will hardly pay much more, because if he needed gold he could get sovereigns by presenting Bank of England notes for redemption, and since 77.10½ is the coinage price, the gold in the sovereigns would have been obtained at that figure. But the gold coin will have lost something by abrasion; hence the margin for bidding on gold bullion. As high a price as 78s. per oz. was paid last April when New York was urgently bidding for London's gold with the aid of the Treasury. Two weeks ago, when New York began to bid, the London price for "bars" was 77s. 9¼d., that price being possible because the Mint is not compelled to pay above 77.9 per oz. This week the market quotation has been to 77.10¾. In December, 1903, the price got to 78s. ½d., the highest of recent years. The historic maximum was the bid of 104s. per oz. in 1814, on Napoleon's return from Elba; but the Bank of England had then suspended gold payments.

It may further be asked, who bids, and how? During August five separate consignments of newly produced and assayed gold arrived in London from South Africa. The London banks of the gold mining companies received it. On the day of its arrival, and often while the gold is still on the water, the agent of such a bank asks bids from the Bank of England and from foreign banks which may want the gold for export. The highest bidder gets it. Naturally the Bank of England always has the advantage in such bidding. It does not have to figure in shipping and insurance charges which a foreign buyer has to pay.

Abstracts of Official Reports.

American Smelting and Refining Company.

The net earnings for the year ending April 30, 1906, amounting to $10,161,368.12, are $1,262,546.76, or 14.2 per cent., in excess of those of the preceding year. The increase has been due both to an enlarged business and efficient and careful management. There has been expended on the property of the company during the year for ordinary repairs, betterments and extraordinary improvements, newly acquired properties and additional plants the sum of $1,766,681.98. Following the practice of the past two years, this whole amount has been deducted from the profits of the year.

Notwithstanding these deductions, the undivided surplus account has been increased by $2,024,054.85, and now amounts to $10,482,774.88, about one-half of which is represented by cash in banks and trust companies, and the balance by other quick assets.

Preferred stock dividends Nos. 24 to 27 inclusive, aggregating $3,500,000, and common stock dividends Nos. 7 to 10 inclusive, amounting to $3,250,000, have been paid. The last three dividends on the common stock have been at the rate of 1¾ per cent. quarterly.

The value of the property on the books of the company has not been increased. However, in addition to new construction and improvements of a miscellaneous nature made at the various plants during the past year, the following notable additions have been made: Perth Amboy, N. J., new copper-refining plant, with a capacity of 75,000,000 lb. annually; Omaha, Neb., new copper-converting plant; Leadville, Colo., increased capacity of lead smelter equal to 7500 tons of charge per month; Colorado and Perth Amboy, additional land, giving increased facilities.

The common stock of the American Smelters' Securities Company, par value $17,751,000, owned by the company, is not included in the investment account of the company. Although it had been thought the earnings of the American Smelters Securities Company would not equal its fixed charges during the first year, for the reason that many of its large properties were still in the development and construction stage, nevertheless they have exceeded its fixed charges by about $500,000.

In addition to the mining interests of the Securities Company, which are operated largely as a base of supply for its various smelting works, it had in successful operation at the time of its organization the following: 1. Lead-smelting and refining works of the Selby Smelting and Lead Company at San Francisco, Cal. 2. Lead-smelting and refining works at Everett, Wash. 3. Lead-smelting and refining works of the Federal Lead Company at Federal, Ill. Lead-smelting works of the Tacoma Smelting Company, at Tacoma, Wash. 5. Copper-smelting and refining works of the Tacoma Smelting Company at Tacoma, Washington.

The construction of the following works was provided for in connection with the capitalization of the company: 1. More than doubling the capacity of the Federal Lead Company's plant and generally increasing its facilities. 2. Construction of a modern concentrator at the Telecotes mining property, making this a very substantial adjunct of the smelting works under construction at Velardena, Mexico. 3. Lead-smelting works at Velardena, Mexico. 4. Copper-smelting works at Velardena, Mexico. 5. Copper-smelting works at Garfield, near Salt Lake City. 6. Copper-smelting works at San Bruno Point, San Francisco Harbor.

The works at Velardena and at Garfield have been practically completed; it is expected that the new smelting plant at Federal, Ill., will be in operation by January 1 next; the ground is now being graded for the San Bruno Point plant, and work has been progressing satisfactorily on all of the other plants enumerated above.

While the mines of the American Smelting and Refining Company have been purchased and operated mainly for their value in assuring a steady supply of certain classes of ores for the smelters of the company, yet these mines have been profitable directly from their operations and they now constitute a valuable asset of the company. It has been the policy of the directors to use the profits of this department to liquidate the original cost of purchase and the continuing cost of development. Early in the present fiscal year these outlays for purchase and development will have been entirely covered by the profits of the department, and the directors expect to carry the profits of the mining department to the credit of profit and loss, beginning with the fiscal year ending April 30, 1907.

The company has not included in its financial statement earnings from the following sources: 1. Use of Huntington & Heberlein patents. 2. Mining of properties of the company. 3. Stock of the American Smelters Securities Company. 4. Stock of the United States Zinc Company. 5. Stock of the United Lead Company.

The directors have thought it best to await a more complete working out of their plans in connection with these various investments before transferring their earnings to the credit of profit and loss account of this company. Since the close of the present fiscal year (April 30, 1906), the directors have effected a sale of a portion of the stock of the United Lead Company.

The increase in the earnings of the company has not been due to increase in treatment charges made to miners, but, on the contrary, such charges have in many instances decreased. It is the policy of the directors to decrease treatment charges to miners, and to thus encourage production wherever the same can be done, and at the same time leave a reasonable assurance of profit to the company. The increase in the earnings has come in the past and must come in the future from economies due to the encouraging of production in territory tributary to works already established, and to the opening up of new territory, together with the earnings of the various subsidiary companies of which the company is the parent and guardian.

Arizona Copper Company, Ltd.

The report of this company deals with the half-year ending March 31, 1906. The total profit from the company's copper mining during that period amounted to £200,778, and the Arizona and New Mexico railroad, which is owned by this company, yielded a profit of £58,428. There remained a balance of £11,874 in the treasury from the profits of the previous half-year. After deducting interest on debentures and other loans, the half-year's operations resulted in a surplus of £249,108. Out of this the directors declared dividends of 28s. 6d. on both the deferred and preferred shares, which absorbed £170,988, and a balance of £78,119 was carried forward.

During the period reviewed, 293,242 tons of first-class and concentrating ore were treated at the company's works. This ore was obtained from the following mines owned by the company: Longfellow, 182,584 tons; Metcalf, 66,704 tons; and Coronado, 43,954 tons. The average yield of the ore mined was 2.4 per cent. copper, so that each ton of metallic copper produced required the treatment of 41.39 tons of ore. The smelters yielded a monthly average of 1181½ tons of metallic copper, and a total for the half-year of 7081 short tons of pig copper. The concentrators dealt with 275,905 tons of ore for a return of 42,294 tons of concentrate. The acid plant yielded 1502 tons of sulphuric acid, as compared with 1440 tons during the previous half-year. It is proposed to improve the capacity of this plant by adding four lump burners to it.

The leaching plant treated 41,395 tons of tailings for a return of 1,210,418 lb. of copper. As compared with the previous six month, the consumption of tailing showed a decrease of 8,013 tons, and there was a falling off in copper production amounting to 26½ tons.

The superintendent reports that the mines are in good condition and the prospects for the present half-year are excellent. In the Longfellow North Extension mine, a new vein 50 ft. wide carrying about 3 per cent. copper has been developed. The cutting of the King vein, in the 4th level of the King mine at a depth of 450 ft. below the first level, was a noteworthy feature of operations during the period reviewed. This vein, at the lowest point it has been cut, is 18½ ft. wide and averages over 5 per cent. copper.

It has been drifted on for a length of 150 ft., and its contents for that distance are uniform. This find greatly enlarges the company's reserves of rich ore.

In the Matilda shaft of the Coronado mine, a low-grade orebody was cut in a cross-cut from the 700-ft. level. It is about 50 ft. wide.

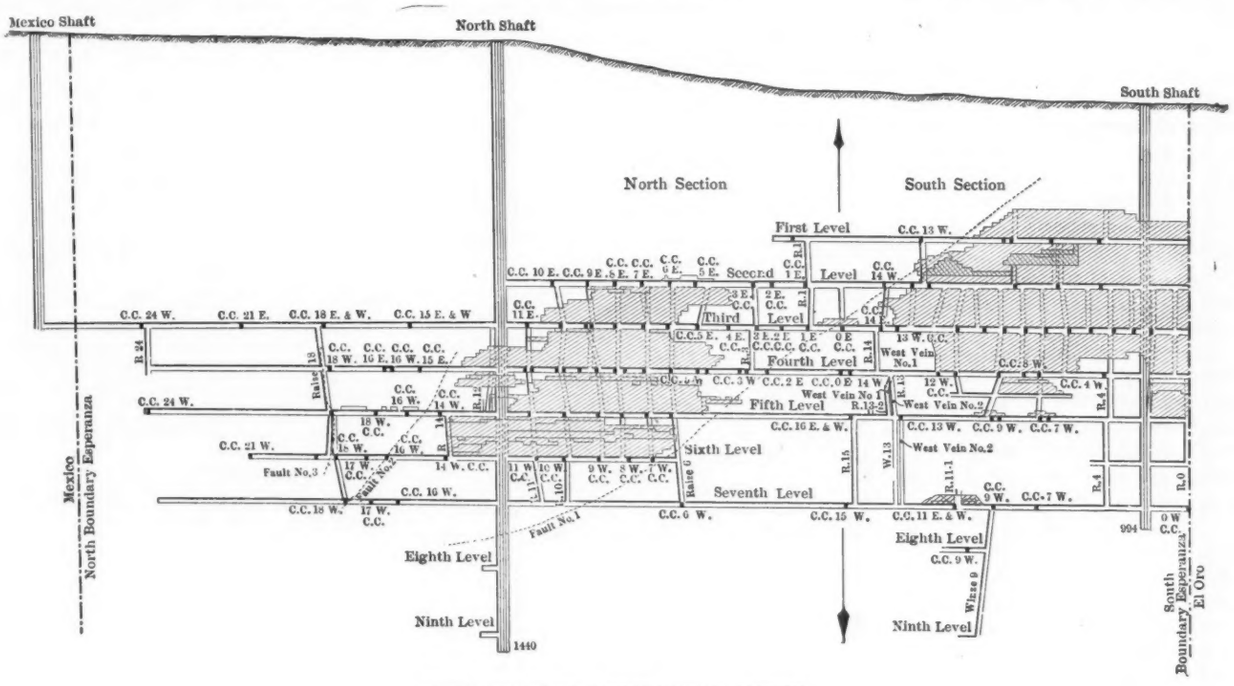
During the present half-year it is proposed to raise the track and straighten out the curves on the Coronado railroad, with the view of minimizing the wear and tear of the rolling stock, and preventing delays from washouts during the winter, which in previous years frequently caused considerable trouble at the smelters.

Esperanza, Limited.

The second annual report of this company, which operates the Esperanza mine and cyanide mill at El Oro, Mexico, deals with the period from Nov. 1, 1904, to Dec. 31, 1905. During that period dividends amounting to £375,375, equivalent to 82½ per cent. on the capital of the company, were distributed, and the directors express the belief that during the present fiscal year a much larger distribution of dividends will be made.

During the period under review 225,239 tons of ore were mined. The cyanide mill treated 196,485 short tons of ore and concentrate, the costs being as follows: Mining and delivering to mill bins, 15s. 10d.; concentrating, 6d.; and cyaniding, 8s. 7d. per ton. The total mining and cyaniding cost was £1 4s. 5d., as compared with £1 8s. 10d. in 1904. The average value of the ore treated at the mill was about 0.54 oz. gold and 4 oz. silver per ton. It is estimated that the mine has produced from the time of its discovery up to Dec. 31, 1905, over £2,500,000 worth of ore.

No sinking was done in the north and south shafts during the year, the vertical depths of those shafts remaining at 1440 and 990 ft. respectively. The mine workings aggregate 48,307 ft. in length, of which 11,927 ft. were driven during 1905. No developments of importance have resulted from this prospecting work carried out in, and below, the seventh level, but promising areas remain to be explored with reference to the west vein's northerly extensions at, and above, the seventh level, and with reference to the San Rafael vein below the seventh level. The company's consulting engineers report that an examination of the workings at the end of the year disclosed the fact that there are about 127,240 tons of ore developed in the Esperanza y Anexas ground, which should yield an operating profit of approximately £1,052,500.



ESPERANZA MINE, LONGITUDINAL SECTION.

Experiments made with a view of treating the large tailing dumps on the mine showed that owing to their low average value the most profitable way of dealing with them is that now practised, namely, flooding the dumps with water, and allowing it to percolate through the mass. This water is afterward caught below the dumps, and the metal carried in solution is precipitated on zinc shavings, and recovered. The small amount of cyanide solution remaining in the tails when discharged from the tanks, in combination with the weathering and oxidizing effects of the atmosphere, apparently permits a small further dissolving of values. The manager reports that he is of opinion that the weathering and leaching of the dumps will probably continue for a considerable time before all the recoverable values are leached out. The extraction now being made at the mill is 91 per cent. by weight of gold and 50.90 per cent. of silver from ore, and 54.63 per cent. gold and 25 per cent. silver from concentrate.

Tyee Copper Company.

This report is for the year ending April 30, 1906, and deals with the operations at the company's mine at Mount Sicker, and smelter at Ladysmith, Vancouver Island, B. C. During the year only 24,483 tons of ore, broken from the old workings, were shipped from the mines, as compared with 49,744 tons in the previous year. But the returns were satisfactory, and, in addition to covering the total expenses of the year's development work in the mine, enabled the directors to set aside a sum sufficient for the payment of a 5 per cent. dividend and carry a substantial balance forward.

The principal development work was the sinking of the main shaft from the 700-ft. level to a depth of 1020 ft., and cross-cutting at the 800-ft. and 1000-ft. levels. At 1000 ft., the country rock was found to change, the talcose schists of the upper levels giving way to a formation of soft schists, dipping to the south. This formation is not exactly the same as that in which the orebody in the upper levels was found; but it bears a strong resemblance, and the mine manager does not hesitate to express the opinion that at a further depth the formation will exactly resemble the ore-bearing one near the surface, and will carry workable ore. The lower workings are now in a fissure directly connected with that carrying the ore in the upper levels, and patches of barytes carrying low-grade ore are encountered.

During the year a small diamond drill, with a capacity of 300 ft., was success-

fully employed in prospecting the workings. It drilled 2705 ft. at an average cost of $1.89 per ft. Toward the end of the year a larger drill, having a capacity of 3000 ft., was purchased. It is installed on the surface for exploratory work. The first 400 ft. bored by it cost $5.64 per ft. It is proposed to continue the bore to a considerable depth.

The smelter treated 27,976 tons of ore, of which 23,979 were forwarded from the company's mine, and 6580 tons were custom ore. The Tyee ore averaged 4.85 per cent. copper, 2.80 oz. silver, 0.145 oz. gold, 12.16 per cent. iron, 7.34 per cent. zinc, 13.82 per cent. silica, and 37.57 per cent. barium sulphate. The raw ore fines and concentrate were bricked and roasted with satisfactory results, both as regards the thoroughness of the roasting and the condition of the product for smelting. The amount of ore bricked was 3107 tons, being 30.18 per cent. of the ore roasted. The smelting mixture was as follows: Tyee raw ore, 42.50 per cent.; Tyee roasted ore, 21.60 per cent.; Tyee roasted brick, 9.34 per cent.; custom ore 12.80 per cent.; flux, 4.35 per cent.; flue dust, 2.98 per cent.; slag and barrings, 1.67 per cent., and low-grade matte 4.76 per cent. The ratio of coke to ore was 1 ton of coke to 9.93 tons of ore and 1 ton of coke to 11.52 tons of mixture. The concentration was 9.04 tons of ore to 1 ton of matte.

The average contents of the slag were: Copper, 0.375 per cent.; silver, 0.13 oz.; iron oxide, 19.24 per cent.; silica, 32.34 per cent.; barium oxide, 27.89 per cent.; calcium oxide, 4.9 per cent.; zinc oxide, 5.89 per cent.; alumina, 9.78 per cent. The flue dust averaged: 3.77 per cent. copper, 2.74 oz. silver, 0.14 oz. gold, 11.77 per cent. iron, 18.56 per cent. silica, 28.30 per cent. barium sulphate, 1.5 per cent. lime, 6.79 per cent. zinc, 5.49 per cent. alumina, and 5.82 per cent. sulphur as sulphides. The smelter produced 3171 tons of copper matte during the year, which realized a value of $17.67 per ton of ore smelted.

English Crown Spelter Company.

The report of this company, which operates zinc mines near Ponte di Nossa, Italy, covers the year ending Dec. 31, 1905. During that period 8253 tons of raw calamine and blende averaging 42.23 per cent. zinc, as compared with 14,435 tons assaying 44.96 per cent. zinc in 1904, in addition to 14,181 tons of concentrating ore of average grade were mined. From the latter ore 8911 tons of calcined zinc concentrate were obtained and delivered at Swansea, Wales, at a total cost of £4 14s. 5d. per ton. In addition to the ore produced in the company's mines, 6635 tons of blende were purchased from other mines and treated at the company's smelters for a return of 7645 tons of metallic zinc.

The net returns of the total operations of the company for the year, after allowing for a loss of £10,000, through being compelled by its obligations to take up mortgage debentures of that value issued by the Welsh Crown Spelter Company, which is now in liquidation, yielded a profit of £17,938 which, with a balance of £300 brought forward from the previous year, gave a total of £18,239. Of this amount £3000 were added to the reserve account, bringing it up to £11,000, £537 9s. 5d. were carried forward, and the balance was distributed in dividends, which amounted to 17½ per cent. for the year.

A New Calorimetric Method.

M. Casaubon, in *Journ. of Gas Lighting*, 1906, XCV, pp. 41-42, has described a new calorimetric method which consists in measuring the proportion of air required for the complete combustion of a gas, instead of directly measuring its calorific value. It is stated that, despite the differences in the calorific values of the variable constituents of a gas, it can be shown by calculation that an accurate determination of the heating power can be made by observing the ratio of air to gas. Even in the case of coal gas enriched with benzine, the error is only something like 8 calories per cubic meter.

In carrying out the method, the gas is burned in a Bunsen burner to which the air and gas are supplied from separate meters, the flame being maintained in a closed space provided only with an orifice at the top for the escape of the products of combustion. By observing the appearance of the flame while the air supply is increased or diminished, one can see the exact point at which complete combustion is occurring, but an easier method of ascertaining this point consists in surrounding the flame with a mantle of oxide of cerium, and noting when the color of the mantle changes from red to white. It is stated that an infinitely small change in the supply of air is sufficient to change sharply the red color, due to a reducing flame, to a white color, due to an oxidizing flame. A ceria mantle is easily obtained by soaking an ordinary mantle in a 30 per cent. solution of cerium nitrate.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Published Week Ended Sept. 4, 1906.

829,956. PROCESS OF BURNING CEMENT. Byron E. Eldred, New York, N. Y. Filed May 1, 1905.

829,957. APPARATUS FOR MAKING CEMENT CLINKER—Byron E. Eldred, Bronxville, N. Y. Filed Aug. 9, 1905.

829,959. ORE SEPARATOR — William B. Frantz, Lansing, Kans. Filed Dec. 8, 1905.

829,974. ELECTRICALLY OPERATED MINE-DOOR-ACTUATING MECHANISM—John C. Lincoln, Cleveland, O., assignor to The Lincoln Company, Cleveland, O. Filed April 10, 1903.

830,036. ROCK AND COAL-DRILLING MACHINE—Nicholaus Zomer, Wilkesbarre, Pa. Filed April 21, 1906.

830,037. COMPOUND FOR FORMING THE BOTTOMS OF METAL-HEATING FURNACES—Dawson Aderholt, Royalton, Pa., assignor to Middletown Car Works, Middletown, Pa. Filed May 9, 1906.

830,039. MATTE-PRODUCING FURNACE—Ralph Baggaley, Pittsburg, Pa. Filed June 30, 1904.

830,040. METHOD OF SMELTING ORES AND SEPARATING MATTES—Ralph Baggaley, Pittsburg, Pa., Charles M. Allen, Lo Lo, Mont., and Edward W. Lindquist, Chicago, Ill.; said Allen and Lindquist assignors to said Baggaley. Filed Feb. 1, 1905. Renewed Jan. 13, 1906.

830,045. CONVEYING SYSTEM—Hiram W. Blaisdell, Los Angeles, Cal. Filed Feb. 1, 1904.

830,079. SPUD FOR DREDGES—George W. King, Marion, O., assignor to The Marion Steam Shovel Company, Marion, O. Filed June 2, 1906.

830,107. SPRAGGER FOR MINE CARS—Santford Sluder, Coalmont, Ind. Filed June 14, 1906.

830,152. HOT-AIR SYSTEM FOR BLAST FURNACES—Thomas Kiddle, Ladysmith, Canada. Filed Sept. 30, 1905.

830,196. APPARATUS FOR PRODUCING WHITE LEAD—John W. Bailey, Jersey City, N. J., assignor, by mesne assignments, to United Lead Company. Filed Dec. 5, 1900.

830,278. PYROMETER—Francis J. Albrecht, Pittsburg, Pa. Filed May 12, 1906.

830,281. MINE DOOR—Cecil R. Anderson, Ben Avon, Pa. Filed Jan. 17, 1906.

830,283. APPARATUS FOR OBTAINING ZINC—John Armstrong, London, England. Filed Sept. 20, 1905.

830,311. APPARATUS FOR TREATING WET PEAT OR TURF—Martin Ekenberg, Stockholm, Sweden. Filed July 6, 1903.

830,349. PULP SCREEN — Eugene Meurer, Muskegon, Mich. Filed March 30, 1906.

830,385. HOIST—Samuel T. Wallace, Los Angeles, Cal. Filed Dec. 23, 1905.

830,387. REDUCING AND SEPARATING SYSTEM—Martin S. Weber, Ephrata, Pa. Filed May 2, 1905.

830,388. APPARATUS FOR TREATING SLIMES AND SIMILAR MATERIALS—William T. Weekley, Kalgoorlie, Western Australia. Filed March 27, 1906.

830,425. ORE CONCENTRATOR—William E. Ford, Carthage, Mo. Filed May 10, 1905.

830,426. DREDGING MACHINE—Charles V. Foreman, Thurmont, Md. Filed June 30, 1906.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Published Week Ended Aug. 25, 1906.

17,178 of 1905. ELECTRIC FURNACE—P. Gredt, Luxembourg, Germany. An improved electric furnace for refining iron and steel.

25,107 of 1905. MINER'S SAFETY LAMP—E. A. Hallwood, Morey, Yorkshire. Improved method of making the gauzes of miners' safety lamps.

98 of 1906. ZINC RETORT—Soc. An. de Biache St. Vaast, Paris, France. Apparatus for discharging zinc retorts by means of a blast of compressed air or steam.

2146 of 1906. ROLLING MILL—Aluminumwarenfabrik, Gontenschevil, Switzerland. A rolling mill for producing aluminum foil less than one-tenth of a millimeter in thickness.

3004 of 1906. STEEL MIXER—Société Electro Metallurgique Francaise, Froges, France. A mixer for steel coming from several furnaces, by means of which the grade of steel may be made uniform, and heated by means of electricity so as to prevent oxidation.

3901 of 1906. METALLURGICAL PROCESS—W. Brinton, High Bridge, New Jersey, U. S. A. Toughening castings and forgings of manganese steel by placing them in the annealing furnace before they have had time to grow cold.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURAL informed of their movements and appointments.

R. L. Lloyd, of Cananea, Mexico, is in Mexico City, on professional work.

F. Lynwood Garrison, of Philadelphia, was a recent visitor in New York City.

J. J. Rutledge, of Baltimore, Maryland, has been a recent visitor in New York City.

Col. W. C. Greene, of New York, is at Sylvania Lodge, Michigan, the guest of Thos F. Cole.

John D. Ryan, of Butte, has recently been in the Lake Superior copper and iron districts.

James B. Oliver, president of the Oliver Iron & Steel Company, Pittsburg, has sailed for Europe.

A. S. Dwight. of New York, is in Tezuitlan, Puebla, Mexico, in the interests of New York capital.

Cyrus Robinson, of New York, has returned from an extended trip on professional business in the West.

Herbert C. Hoover, of London, who has been in the United States for several weeks, sailed for Europe on Sept. 4.

Charles L. Whittle, mining engineer of Boston, is in Cobalt, Canada, in the interest of the New England Associates.

George W. Ade, trustee for the Copper King, Ltd., has changed his residence from Fresno, Cal., to Quartz, Tuolumne county, Cal.

Urban H. Broughton, president of the Utah Consolidated Mining Company, has returned to New York from a trip in Europe.

W. E. Defty, of Phoenix, Ariz., will be engaged in professional work in Sonora and Sinaloa, Mexico, until the middle of September.

S. T. Wellman, president of the Wellman-Seaver-Morgan Company, Cleveland, Ohio, has returned from a three months' trip to Japan.

J. A. Hilliker, of the Garvin Cyanide Extraction Company, of Portland, Ore., has been at Johnnie camp, Nev., looking for treatment ores.

Alfred Merritt, of Pasadena, Cal., who is to build a large blast furnace at Seattle for treating ore from his mines in southeastern Nevada, is at Duluth.

E. B. Thomas, president of the Lehigh Valley Coal Company, arrived this week from Europe, where he has been traveling for the last four or five weeks.

Guy C. Staltz, engineer and metallurgist for the Port Henry Iron Ore Company, Mineville, N. Y., spent the last week at the iron and steel furnaces at Hamilton, Canada.

H. L. W. Hyde, who is engaged in the steel business in Pittsburg and is a heavy stockholder in several copper companies in Montana, spent two weeks in Butte recently.

J. Edward Spurr has been a recent visitor in New York. He has now gone to Mexico on professional business on which he will be engaged for two or three months.

John A. Topping, head of the Republic-Tennessee Company, whose headquarters are in Pittsburg, is in Birmingham, Ala., watching the erection of his company's new steel plant at Ensley.

Ralph Nichols, formerly manager of the property of the Great Bowlder Perseverance Company in Australia, now managing the Avino Mines of Mexico, Ltd., in the state of Durango, Mexico, visited Butte a few days ago.

George B. Brown, until recently general superintendent of the Carpenter Steel Company, Reading, Penn., has accepted the position of superintendent of the crucible department of the Bethlehem Steel Company, South Bethlehem, Penn.

Archibald C. Milner, of Salt Lake, interested in southern Utah iron fields, and in irrigation projects on the Snake river, has recently been in the Lake Superior iron districts and Duluth. Mr. Milner's plans for a large steel mill on Utah lake are developing.

Howard E. Troutman, for ten years connected with the Buckeye Engine Company and for several years manager of its Chicago office, has resigned to accept the sales management, Corliss and High Speed Engine Department of the Atlas Engine Works, Indianapolis.

Woolsey McA. Johnson, of Hartford, Conn., is making a trip through Colorado, Utah and Arizona, to investigate the methods in use for the concentration of zinc ores, with a view to determining their bearing upon the new electric smelting process, upon which he has recently secured patents.

W. H. Whiteside, president of the Allis-Chalmers Company, Milwaukee, Wis., returned Aug. 22 from a two month's combined business and pleasure tour of England, France, Germany and Switzerland, in the course of which he inspected various large manufacturing industries. Among them he visited the plants of the leading English steam-turbine builders, as American rights for building Parsons steam turbines for marine and land use are enjoyed by the Allis-Chalmers Company.

Among the prominent Europeans in Mexico to attend the Geological Congress are Bernard Hobson and H. M. Caldwell, of England; W. Scipio and G. Philippi, of Germany; Dr. M. Tanichevcky, of Russia; T. Iki, of Japan; General Lamothe and A. Offret, of France; Dr. Scheneke, of Germany; Dr. Stobbe, of Germany; Dr. V. Hackmann, Dr. W. Wahl and Dr. C. Klawatsch, of Germany; Dr. Rudolph Yuber, of Vienna; Consul F. Dorenberg, of Puebla; Dr. Ed. Seler and H. Kirchfeld, Berlin; W. Freintzel, Essen; A. Langeman, Hamburg; A. Stolle, Bonn; and Y. Freidlander, Italy.

Obituary.

Thomas Septimus Austin, general superintendent of the Southern Department of the American Smelting and Refining Company and also a member of the executive committee of that department, died at El Paso, Texas, Aug. 22, 1906, in the 53d year of his age. He was born at Stratford, Conn., of a family capable of keeping up through continued prosperity the traditions of inherited training. Of this family he was the seventh son; hence his second name. Brought up to the active and varied life of a suburban town, he was well fitted physically to his life's work.

Graduating in 1876 from the School of Mines of Columbia University, he spent a year in Cuba as a chemist, but soon drifted West, where for a short time he operated an assay office under the title of Murphy & Austin. In 1879 he became assayer for the Germania Smelting Company, of Salt Lake City, of which his classmate, A. F. Schneider, was then superintendent. From 1880 to 1882 he was assistant to the latter, during that time developing several slag types so essential in lead smelting and fully described by Mr. Schneider in the *Transactions* of the American Institute of Mining Engineers, Vol. XI, p. 56. Later he was superintendent of a silver-lead smelting works at Ketchum, Idaho, but in 1883 returned to the Germania Works as its superintendent, and remained there for 4½ years.

From the Germania Works he went to the Rio Grande Smelting Company, at Socorro, N. M. In 1890 he was married to Miss Dorothy Lockhart, of Socorro, and soon afterward was appointed superintendent of La Gran Fundicion Mexicana, at Monterey, Mexico, in the construction of which he took part. The tropical climate and anxieties arising from inefficient labor and the starting of the plant in operation so told on him that he was led to terminate his engagement there in 1893, and to take a much needed vacation. This he utilized by a visit to the East, where he took up some special study in electricity and later returned to the West to carry on some mining work in which he was interested. In 1894 he again went to Chihuahua, Mexico, where he was confronted with problems of treating oxidized lead ores which his predecessors had found difficult to reduce. To improve reduction he raised the feed floor of his blast furnace and by skilful furnacing was able to overcome the difficulty. In 1896 he became superintendent of the Graphic Works at Magdelena, N. M., and in 1897 was called to the charge of the furnaces of the El Paso

Smelting Works, which were then controlled by the late August R. Meyer. One of the first things he did there was to remove the siding from the blast-furnace building to improve the ventilation. Fluorine present in some of the Mexican ores was a source of considerable trouble, since it rendered inefficient a certain portion of the lime and therefore that element had to be carried at a much higher percentage than ordinarily to insure fluidity and proper reduction. In spite of conventional practice he forced up the tonnage of his furnaces and found that contrary to preconceived notions he was still able to make clean slags. Another point was the bringing of the separating furnace into satisfactory operation, which was assisted by the greater tonnage and more regular operation of the blast furnaces.

At the El Paso plant he was called upon to decide regarding ores, ore contracts and to familiarize himself with questions of freights, tariffs and duties, so that he became informed both on the commercial and the technical sides. He still supervised the direct operation of the furnaces, which he was able to keep in good working condition through his intimate knowledge of their requirements. After the organization of the American Smelting and Refining Company, the expansion of the operations of the Southern Department called for the construction of new plants, and he was appointed general superintendent of this department, including the two plants in Mexico and that at El Paso, with charge both of operation and construction. Last Spring he was promoted to the executive committee of the department.

He was able to carry on his varied duties with unabated vigor up to near the last of his life, the immediate cause of his death being diabetes, which insidious disease carried him off with scant warning and after only a two days' illness. He was noted for his high executive ability and for the loyalty, respect, and affection with which he was able to inspire his men.

Industrial.

The H. W. Johns-Manville Company suffered a small fire at its Brooklyn plant, Aug. 30. The damage was small and has not in any way interfered with the business of the company.

The Vulcanite Portland Cement Company, of Philadelphia, Penn., has published a valuable pamphlet entitled "Economical Selection and Proportion of Aggregate for Portland Cement Concrete," of which the author is Albert Moyer, sales manager of the company.

The Chicago Pneumatic Tool Company, of Chicago, Ill., has opened a branch office at 1012 Memphis Trust Building, Memphis, Tenn. The company has in press a new compressor catalog, of 118 pages, showing several new types and sizes of compressors, and also the new Hamilton-Corliss machine.

Pilling & Crane, of Philadelphia, Pittsburg and New York, have published an interesting chart showing graphically the production of pig iron in the United States, at decennial intervals from 1830 to the present time, and also the production of pig iron per capita in the United States.

Chisholm, Matthew & Company has secured the contract for a large installation of Edwards roasters in the new Golden Cycle mill now under construction at Colorado City. Philip Argall is consulting metallurgist for this concern, and the new plant will, when completed, be perhaps the best cyanide plant on the continent.

The Bessemer (Ala.) Coal, Land and Improvement Company, at a stockholders' meeting, increased its capital stock by $250,000. This company owns and operates coal mines in Bibb county, Ala., and at Rock Wind, Tenn. In addition to the coal interests the company controls a large amount of lands in and around Bessemer. It is understood that the additional capital stock will be used in improving and developing the coal lands.

The Traylor Engineering Company, of New York, has entered into a contract whereby Shirley & Grant, of Reno, Nevada, become exclusive representatives of that house for the State of Nevada, for the sale of their machinery for mining, sampling, rock and ore crushing, milling, cyaniding, amalgamating, smelting, refining, fuel briquetting and cement making. A close relationship has been established under which the two houses will co-operate in designing and building entire plants, as well as in the sale of individual pieces of machinery.

The Southern Steel Company, at a meeting of its stockholders, decided to increase the capital stock of the company from $16,000,000 to $25,000,000. The additional stock will be $5,000,000 preferred and $4,000,000 common. The object of the increase in stock is to enlarge the company's capacity and to provide for development. It is generally understood that the properties of the Lacey-Buek Iron Company and the Chattanooga Iron Company, each company owning and operating blast iron furnaces, coal and ore mines, coke ovens and limestone quarries, will be absorbed. The full announcements will be made in the near future. Rumors which prevailed a few weeks ago that other companies in Alabama would be invited to participate in a concentration scheme lack confirmation and are denied. The Southern Steel Company continues to ship much of its steel rod, wire and nails from its Ensley plant to foreign countries, Porto Rico, Cuba, Japan and China. Much wire is being shipped into the Southwest and into Mexico.

Trade Catalogs.

Receipt is acknowledged of the following catalogs and circulars.

Chicago Pneumatic Tool Company, Chicago, Ill. *Ideal Power,* August, 1906; pp. 18, illustrated; 5x8 in. paper.

Sargent Steam Meter Company, Chicago, Ill. Sargent Steam Meter; pp. 16, illustrated; paper, 3x5 in. 1906.

New York Engineering Company, New York City. Dredges and Gold Dredging; pp. 19, illustrated; paper, 6x9 in. 1906.

The Deister Concentrator Company, Fort Wayne, Indiana. The Deister Ore Concentrator; pp. 12, illustrated; paper, 5x9 in. 1906.

Oswego Boiler and Engine Company, Oswego, N. Y. Bulletin No. 50-A, Horizontal Return Tubular Boilers; pp. 3, illustrated; 8x5 in. 1906.

Construction News.

Consolidated Mining and Smelting Company—Among extensive improvements at the smelting works of the Consolidated Mining and Smelting Company, of Canada, at Trail, are large receiving bins and new sampling mill for copper ores. Three bins 28 ft. high, two 18x16 ft., and one 12x16 ft., feed directly into a No. 8 McCully crusher, built by the Power and Machinery Company, of Cudahy, Wis., having a capacity of 200 tons per hour. Other bins, eight or ten in number, and 16x16 ft., and 30 ft. high, discharge into cars drawn by an electric motor to the crusher. Other machinery in the sampling mill is Vezin automatic samplers, two more crushers and three sets of rolls. Elevators are Hadfield's New Era manganese steel chain with 32-in. buckets. From the sampling mill the ore passes into bins under which run trains of ore cars drawn by electric motors to the blast-furnace bins. Ore trips consist of three to four cars, each containing about six tons. Handling from the time the ore is dumped from the railway cars into the receiving bins until it reaches the furnace bins is thus reduced to a minimum. An electric haulage system between the furnace bins and the blast furnaces is being arranged for. Besides the trestle over the receiving bins, which has been extended 300 ft., and is about 40 ft. high at its far end, a trestle runs from the sampling mill to a stock yard where ore not to be smelted immediately after sampling can be stored. The company's lead-sampling mill has been remodeled with the object of increasing its capacity, while also making it possible to crush to a finer mesh, this being required for the newly adopted method of roasting the lead ores by the Huntington-Heberlein process, in connection with which two roasters and 12 converter pots have been installed. A further addition to the latter is under consideration.

Special Correspondence.

San Francisco. Sept. 5.

Some time ago, J. D. Williams bonded about 80 per cent. of the 17,000 acres of land in Indian Valley, Plumas county, intending to dredge the basin for the gold. Indian Valley is one of the fertile large meadows peculiar to the great interior basin of the northeastern part of California, being as level as a floor, with a mean altitude of 3500 ft. above sea level. The valley is 11 miles long and two to four miles wide, and has been used entirely for ranching purposes, but Williams offered much better prices than the land would bring for agricultural work. The bonds on the property expired last week, so the ground will not be dredged for gold after all. Williams intended to prospect it by drilling, but his order could not be filled by contractors, because all their drills are in commission and all that can be constructed for some time to come have already been "placed." When Williams found that he was "up against it," he sought to get drillers from New Zealand, but the law prohibiting the importation of contract labor interfered with that project. Therefore, the whole scheme has been abandoned, much to the regret of those who desired to sell their lands.

The Pacific Hardware and Steel Company—of which Henry T. Scott, formerly of the Union Iron Works, is president—has purchased 20 acres of land in South San Francisco, where it will establish new rolling mills. It is expected that 600 men will be employed at the new plant by the opening of the new year.

The Fulton Iron Works, which lost its office during the great fire of April, had little damage done to its manufacturing plant at North Beach on the bay shore. Last week, however, a fire occurred by which the company lost its foundry with patterns, cores, etc., the rest of the plant being fortunately saved. The loss is some $20,000. Just at this period when pattern makers are very scarce, and their wages exceptionally high, the loss of the company is very inconvenient.

At a recent meeting of the Anti Débris Association, at Sacramento, the attorneys of the association stated that a proceeding to punish William Nichols, Jr., for contempt in violating the injunction granted by the Superior Court of Sutter county had been continued until Sept. 18, and will be heard on that day. In this matter, the association alleges that after the injunction had been obtained Nichols made a contract with the Mike Corcoran Mining Company, of Arizona, by which it was to work the mine and he was to receive a certain percentage of the proceeds, and in which it was to give him a certain sum each month until the price agreed upon was paid, when the mine was to become its property. The association claims that this is a violation of the injunction.

At the same meeting the Eagle Bar Mining Company and the Imperial Mines Consolidated reported that there had been no hydraulic mining on the Eagle Bar since Aug. 1, 1906, and no work of any character on the Imperial mines. They said that the information submitted to the association relative to injurious hydraulic mining committed by them was misleading, and they would like an opportunity of appealing to the committee. It was finally decided to ask them to be present at the next meeting of the association. At the present time the mines are closed, for the reason that there is no water.

Wm. N. Harts, secretary of California Débris Commission, says that the question of disposing of mining detritus in the Sacramento and Feather rivers, by means of using dredges for placing the material on the banks, has not thus far received the careful consideration of the débris commission. It is considered that this plan would meet with the approval of many of the members of the Miners' Association, as well as that of the Anti Débris Association organization, if it be found practicable.

The Great Western Gold Company, of Ingot, Shasta county, which has been hauling its coke by wagon from the railroad, is now arranging for a broad-gage track from Redding via Swede Creek to Ingot. The new branch road will be about 28 miles long, and will greatly facilitate operations at the smelter.

The North California Mining Company has petitioned the Superior Court to grant an immediate injunction against Robert McAvoy and John Fullman, to restrain them from cutting timber on land belonging to the company on the Feather river, near Berry creek, Butte county.

Suit for damages has been commenced in the Superior Court in Nevada county by the New Blue Point Mining Company for $12,500 and costs. The Blue Point alleges that the New York-Grass Valley has for three years made use of the ditch, water and dam claimed by it. The defendant claims that the rival concern owns no interest in the ditch or water. It is commonly termed the "Pat Campbell ditch," having been constructed by him to operate his hydraulic mine near Smartsville, Yuba county, many years ago. Campbell is arranging to start up again, but must have his ditch for this purpose.

The old Quartz Hill mine at Scott Bar in Siskiyou county has been in litigation for nearly 20 years, but is now being reopened by a new company of which L. D. Crawford is superintendent. A ditch is being built and new hydraulic pipe is being laid preparatory to active work on the property.

The Standard Portland Cement Company, at Napa Junction, Napa county, is having trouble with its employees who have struck for a raise in wages from 18c. to 20c. an hour, and the plant has been temporarily closed down.

A vein of ore carrying silver and copper has been found in the summit of the Sierra east of the Sonora and Mono road. Float copper ore, very rich, was found in the vicinity some years since and the source has been persistently hunted for, without success until recently.

The Brown Bear mine, Deadwood, Trinity county, has a record for large production, but owing to the death of the principal owners systematic work stopped two years ago, since when only leasing work has been going on. Chas. Webb and W. H. Goulet, two lessees on the mine, have now cut a new shoot on a level 60 ft. below where good ore was formerly taken out.

The Marbelite Plaster Company, a San Francisco corporation, is about to make plaster from gypsum deposits near Lovelocks and Mound House, Nevada. The crude material has heretofore been shipped for fertilizing purposes. Now the grinding will be done at Reno, Nevada.

The business portion of Stent, a mining town in Tuolumne county, where the Jumper and other gold mines are situated, has been destroyed by fire. None of the mining plants was injured.

Agents of the Government have commenced investigation into the methods of locations of mines and timber land in Butte and Plumas counties by the North California Mining Company. This is the result of persistent work on the part of State Mineralogist Lewis E. Aubury, who has contended that many claims have been located by fraudulent methods. H. H. Yard, who is the manager of the company, on the other hand asserts that he has nothing to fear from the investigation now in progress, that assessment work has been done regularly, and that patents have only been taken upon land which is genuinely mineral land. He acknowledges that some of the land upon which mineral claims have been filed is probably worthless for its mineral wealth, but points out that such land has not been patented, and that the filing of a mineral claim has not excluded entry for either homestead or for the acquisition of timber land, in accordance with the law governing the acquisitions of such land. Some 200,000 acres of land have been taken up by the company in the counties named.

A mining town has been at last established in Death Valley, Inyo county, and it bears the novel name of "Skidoo." The new town is located 40 miles north and a little east of Ballarat on the Death Valley side of the Panamint range, and is in close proximity to Emigrant Springs. Its altitude is about 5000 ft. Twenty-three claims have been located and named "Skidoo," numbered from 1 to 23. About 40 men are at work in the mines. A pipe line is being laid to bring water into the new camp.

A stock dividend has been declared by the Balaklala company to stockholders who have owned shares from July 6 to September 10, 1906, they receiving an additional

share for every three shares previously owned. The company now has about $800,000 in cash in its treasury. It is expected that the smelter of 1000 tons daily capacity will be completed inside of the next six months.

Salt Lake City. Sept. 8.

The August ore and bullion settlements in Salt Lake reached the total of $2,423,000.

The directors of the Mammoth Mining Company have posted a dividend of 5c. a share, or $20,000, payable Sept. 20.

The Utah Car Service Association, which undertook recently to cut the free time for the loading and unloading of ore, at mines and at samplers and smelters, down to two days, has modified its previous ruling by allowing one day additional. This was done only after pressure had been brought to bear on the several railroad companies operating in the State.

Duluth. Sept. 10.

Lake Superior iron-ore shipments for August showed the expected decline, and for the year to date amount to 22,721,095 long tons, distributed as follows: Duluth, 6,584,272; Two Harbors, 5,361,722; Superior, 3,578,496; Escanaba, 3,436,611; Ashland, 2,251,057; Marquette, 1,708,937 tons.

Of this, the Mesabi range furnished 14,324,490 tons, a larger proportion than it has ever supplied in the past. This season is 1,670,000 tons ahead of last year to this date, and the total increase for the year, over 1905, will not be very much more.

The Duluth, Missabe & Northern is putting a part of its big No. 4 dock into use and hopes to make a total this month close to 2,000,000 tons. Of the total increase of this year, two-thirds was by this road.

The annual report of W. H. Harvey, mine inspector of St. Louis county, shows that 96 men have been killed at mines in the county during the year, or one man for every 230,000 tons. Most of the deaths were from accidents at steam shovels and around surface tracks, though the careless handling of powder was a prolific cause of accidents. There were 78 mines in operation, and 12 idle, during the year. There were 12,838 men employed, on the average, during the year. Average daily wages of underground men was $2.28, and of surface men and skilled labor $2.50.

London. Sept. 1.

Mining men will regret the loss by theft of the celebrated Mother Shipton gold nugget, which was stolen on Aug. 29 from its temporary resting place, the window of the Orient Pacific Steamship Company in Trafalgar square. This nugget, though so called, was really a "specimen" of quartz ore. It weighed 26 lb., and was valued at £1396. It was extracted from the Mother Shipton mine at Temora, New South Wales, about 25 years ago. Its real home was the Sdyney museum, but it was lent out from time to time for various purposes. At the time of its loss it was as mentioned in the window of the Orient Pacific line, and was under the charge of the New South Wales emigration bureau. It served primarily to draw attention to the mineral riches of the colony and so attract emigrants, and secondarily, to stimulate traffic for the steamship company. The theft was effected by some unknown persons, who boldly broke the great plate glass window in the middle of the night, and walked off with this and other smaller specimens of ore. It was a wonderful piece of thieving, considering the public position of the building, the keen police patrol exercised in the neighborhood, and the weight of the booty. From the very nature of the case it is doubtful whether it will ever be seen again. However, it has lived a useful life, having helped to stimulate business of all sorts, when prosaic returns of lower-grade ore in larger quantities would have had no effect, so it can pass from its present state of existence with a clear conscience for a life well spent.

While writing of the loss of this piece of ore, it reminds me that much attention is now being given among English companies to the systematic thefts of gold ore in the West Australian mines. It has been known for a long time that both ore and bullion have been stolen systematically and that the lack of power given to the police and magistrates has prevented any means being taken to check the practice. A few months ago, Mr. Scantlebury, once of the *Sydney Bulletin*, and now of the *British Australian*, estimated the yearly loss at a million pounds, and during his visit to the fields made special efforts to obtain information and stir up public opinion. From a report issued by the chief of police, which has come to hand in London this week, it appears that the thieving is real and extensive, though perhaps not as great as Mr. Scantlebury's estimate. The police appear to know how the thefts are carried out and who the chief offenders are, but owing to smallness of the police force, the difficulties put in their way, and the trivial punishment given to convicted offenders, very little can be done in stamping out the irregularities. It appears that there are quite a number of customs smelters that buy ore and bullion and keep no records of their transactions, and that most of the banks take no interest whatever in the character and source of the deposits made with them. Even the Perth mint accepts gold without inquiry and will not help the police in tracing fraudulent business. So far as can be ascertained the police do not suspect any of the controllers of the mines of robbing their shareholders. The thefts appear to be concocted by certain people, unconnected with any well known producer, who are in league with some of the criminal fraternity, and with members of the staffs at the mines. We hear therefore of superintendents of the retorting room selling amalgam or bullion to criminals, and of carloads of high-class ore being covered with barren rock and tipped on the dump, to be sorted over at night by persons in the ring. That there is a real grievance is now undoubtedly proved, and a good deal will be heard from English shareholders during the coming autumn. Efforts will have to be made to strengthen the hands of the police and to force all buyers or receivers of ore, bullion, and gold to disclose the source from which it is received.

Johannesburg. Aug. 13.

Interesting figures have recently been published, showing the relative death rates of the coolies and Kafirs employed on the mines of the Rand. The Chinese death rate (exclusive of deaths from accidents) is shown to be 19.51 per thousand, while the Kafir death rate reaches the high figure of 46.8 per thousand. The two races are working under exactly the same conditions, and yet the yellow man, who is new to the country, stands the conditions better than the black. In fact, the death rate of the Kafirs from central Africa has reached such a high figure that it has been decided to stop all recruiting for the Rand in this part of Africa. These natives cannot stand the cold winters of the high veldt.

The talk of the town is the new constitution which the Liberal government has granted the Transvaal. Many opinions have been expressed, but the general feeling is one of relief that the political uncertainty has been somewhat relieved. It is felt that the Boers have the best of the bargain. Their organization, "Het Volk," presents an unbroken phalanx, while the British are divided into many factions. It is highly probable that the Boers will obtain a majority in the first government. The anti-Chinese party seems very strong just now.

Mining men view the situation with grave apprehension. Just a year from now the contracts of all coolies (about 2100) on one leading deep-level will be up. If no new ones are allowed to come to the Transvaal, and the time-expired coolies are not permitted to sign on again, then this mine will be forced to close down. By the end of 1907 the majority of the coolies will have finished their three years' contract. Many of them would sign again, but it is questionable if they will be allowed to.

The gold output of the Transvaal for July constitutes a new record, being 491,793 oz., valued at £2,089,004. This splendid record for July has brightened up the market a bit, but it is doubtful if the improvement will last long.

General Mining News.

ALASKA.

The following table reports the receipts of gold and silver, in standard ounces, at the United States Assay Office from the different districts of Alaska, during the fiscal year ending June 30, 1906.

Locality.	Gold.	Silver.
Copper River	784	156
Council	1,882	187
Eagle	3,564	574
Koyukuk	5,105	202
Nome	208,243	21,965
Tanana	310,230	47,645
Valdez	12,787	1,302
White Horse	2,710	456
Unclassified	15,924	3,294
Total	561,229	75,781

The gold had a value of $10,441,447 and the silver was worth $44,652 on the basis of New York market quotations.

ARIZONA.

COCHISE COUNTY.

Superior & Pittsburg—Water in the Briggs shaft has so far diminished that the management thinks the big basin is finally drained. There is now about 1600 gal. per minute coming out, a trifle more than half the maximum flow, and in spite of the drifting, sinking and opening of new ground, which continue steadily. This shaft has been pumping a maximum of 3000 gal. per minute for three years. For months, sinking was at the rate of not more than 6 in. per day, the men working in water to their waists all the time. The lift has been from 930 to 1100 ft. Briggs shaft is now getting into favorable ground, and ore is expected soon. The same may be said of several other shafts of the Superior & Pittsburg, and the properties are in promising shape for early ore production.

Copper Output—August copper production of the Calumet & Arizona smelter was the same as in July and Copper Queen fell off a trifle, but the two did not vary much from recent months, and are at the rate of 150,000,000 lb. per year. When the fourth furnace of the Calumet & Arizona smelter is running, which will be soon, and the last of the new Copper Queen stacks is in blast, this production will be not less than 180,000,000 lb. No. 9 furnace has just been blown in at the Copper Queen, and will add materially to September's output.

Shattuck—Twenty-two months, to the day, from the time the first machine was erected at the Shattuck shaft the mine sent its first ore down the hill over its new Bleichert tram, to the El Paso road, for the smelter at Douglas. The mine is now shipping a small daily product, but will soon be moving at least 200 tons every day; probably in a month the daily product will be 300 tons. The 600-, 700- and 800-ft. levels are all in good ore, and developments on the 700- within the past few weeks have been flattering. About 250 men are working in this mine, and this force will be increased this month.

Holbrook—Copper Queen's new Holbrook shaft will be three-compartment, 4x21 ft. inside timbers, and six stations have been cut, from each of which miners are now beginning to break upward. Openings will be made to the old Holbrook from the 200- down to 570-, which will be the bottom of the new shaft. Old Holbrook is now a blind shaft, being bulkheaded above the 200-, where a small temporary hoist has been placed. Its ore is trammed to the Spray for surface. Mules have been put underground for tramming. The work of grading for the large electrical power house at Sacramento shaft, which is to operate trams and other underground power for the entire mines, has been started and will be carried forward leisurely, with the view of having it in readiness late next year.

Buckeye—An important find of sulphide ore, rich in copper, has been made in the Buckeye claim of Calumet and Arizona on the 1000-ft. level. Its size is not known, and is not likely to be for some time.

GRAHAM COUNTY.

Detroit Copper Company—In the lime quarry on Morenci hill, a blast disclosed a body of good copper ore, much richer than the average of that camp, which is decidedly low. The extent of this new find is not yet known.

PINAL COUNTY.

Lake Superior & Arizona—A dike of porphyry has been encountered, and the knowledge of the geological conditions at Florence is much advanced. It is very important, for it indicates the permanence of the company's ore deposits, and shows how they came to be mineralized.

CALIFORNIA.

AMADOR COUNTY.

Amador-Climax—It is expected that the attachment suit commenced against this mine will shortly be settled. Meantime the mine is being worked on a small scale, but the mill is idle.

San Pedro—This mine in Pioneer district, owned by C. Stirnaman, has been bonded to Mr. Chase, of Sutter Creek, who has commenced development work.

CALAVERAS COUNTY.

Petticoat—C. M. Burleson, of Mokelumne hill, has secured a favorable working bond on this entire group and has arranged with Hammond & Moore, New York, for opening the mine. New machinery will be installed at once, and a double-compartment shaft is being sunk on the north end of the known pay shoots. The development work will be pushed with double shifts, and machinery is now in transit to the mine.

EL DORADO COUNTY.

Crane's Gulch—Morgan, Schneider & Forni have leased this mine from C. M. Fitzgerald and have commenced work on it.

Garvin—This company, at Coso, recently bought the 98 gold mine and has suspended operations on the mine, awaiting the erection of a reduction plant.

INYO COUNTY.

Casa Diablo—At this place the upraise from the floor of the long tunnel, 220 ft., is in good ore. A drift some distance to the west, at the tunnel level, exposes the same high-grade ore.

MARIPOSA COUNTY.

Red Banks—E. C. Loftus, superintendent of the Santa Ysabel mine in Tuolumne county, has purchased this property, which has been extensively developed by tunneling and shows large bodies of ore ready for the mill. The original owners were making preparations to install a 40-stamp mill upon the property when the fire in San Francisco made it necessary for them to change their plans and caused them to dispose of the mine to Loftus.

MODOC COUNTY.

Fort Bidwell Mines—Some 200 men are at work in the mines of this vicinity developing them. A good strike is reported at Windy Hollow, 30 miles north, and another at Stateline, eight miles west.

MONO COUNTY.

Liberty-Pittsburg Mining Company—An exceptionally rich strike is reported in this property in Masonic district, the ore running up into the thousands per ton, in a shallow shaft. It is expected that a mill will shortly be built.

NEVADA COUNTY.

Latham—This mine on Deer creek has not been worked for some years, but the tunnel is now being cleaned out preparatory to operations by miners who have leased the claims.

Unwatered—The work of pumping out the Morning Star and Badger Hill mines, at the latter place, has been completed and both mines are now dry and ready for inspection. If the prospects are satisfactory, the company will take hold of the mines and open them up.

Keller—This mine, which has been worked in a small way for some time, is now to be thoroughly opened by T. J. Torpie, who has put a crew at work. The mine is at Graniteville and is an extension of the Culbertson.

Kansas—This property at Antelope, Ray Crowell manager, was formerly known as the Almono. A five-stamp mill is soon to be erected. The mine has already produced a considerable amount of bullion from the upper levels. The tunnel is now in 350 ft. and will be advanced probably 200 ft. farther before the main formation is cut.

Morning Star—This mine at Badger hill, James T. Gribble superintendent, is being opened up and has been unwatered.

Spanish—The old Huntington mills and other machinery at this mine near Washington have been purchased by Grass Valley men. While Fred Bradley was running this property it made the record for low cost of mining and milling.

Isis—This mine on the South Yuba river near Washington has been closed down. The parties prospecting it have run out of funds.

Charronot—At this mine, Canada hill, the water has been lowered to the eleventh level, and drifting north and south in virgin territory is being done on the sixth and ninth levels.

Squirrel Creek—A Spokane company has acquired 100 acres of patented ground on this creek and will start a three-compartment shaft at a point where George Trotter commenced work.

Junction—A Montana company is opening this copper mine at San Juan, which was formerly a famous hydraulic mining camp.

Lincoln—A San Francisco company has started development work in this mine on Little Deer creek, by a new shaft.

Republic—The mill purchased in Nevada City is being put up at this mine, Graniteville. McLean & Co. have the mine under lease.

Bella Union—W. J. Howard, James Gluyas and others have bonded this mine four miles from Grass Valley and have put a force of men at work on the property cleaning out the main shaft, which was sunk many years ago. The property consists of eight acres of patented land. The mine was abandoned in 1872 on account of a sudden and heavy flow of water in the bottom of the winze.

PLACER COUNTY.

Golden West—At this drift mine, Forest hill divide, E. H. Armstrong, manager, the miners are clearing the tunnel to tap the incline shaft.

PLUMAS COUNTY.

Indian Valley—At this mine, Greenville, a new quartz mill is to be erected as soon as the building material can be put on the ground.

SAN BENITO COUNTY.

Riverside Tract—The gold-bearing clay deposit on this tract has been examined by James Cannon and Edward Nash, who conclude that it will pay to work.

SAN DIEGO COUNTY.

Cuyamaca Mining Company—The Stonewall mine, owned by this company at Cuyamaca, not far from Julian, may start up again shortly. During the idleness the mine has again filled up with water.

California Gold King Company—This company, which now owns 27 claims, built a 1000-ton cyanide plant at Picacho, on the banks of the Colorado river, and constructed a railway from the mill to the mines. A run was made for some time, but two years ago a cloudburst swept away the railway and demolished the works. The company is now reorganized and is expected to start work this winter.

California Queen Gold Mining Company—This company owns nine quartz claims at Picacho. These the company has been developing for four years, and has now extensively opened a vein about 45 feet wide.

SHASTA COUNTY.

Great Western Gold—This company's Afterthought copper mine is to be equipped with an electric hoist. Development in depth is exceeding expectations and the company has decided to continue development of the orebodies already demonstrated, while at the same time carrying on work to the southeast, and farther into the mountains.

SIERRA COUNTY.

Herkimer Gravel Mine—At this mine, 11 miles from Downieville, Henry Fowler, superintendent, they have lately driven 800 ft. of bedrock tunnel and have from 100 to 300 ft. farther to go before reaching the pay channel.

SISKIYOU COUNTY.

Gravel—The men who are working the gravel bed within the limits of the town of Henley struck a rich pay-streak recently and a hoisting plant and steam pump are being installed.

Morrison & Carlock—At this mine, in Quartz Valley, the new machinery for sinking is in place, and a force of 35 men is working. A shaft 200 ft. deep will be sunk on the vein. The company expects to run the 10-stamp mill constantly for the next year.

Greenhorn Blue Gravel—Carters & Co. have started this old property near Yreka. They intend sinking a shaft, using the steam pumps now on hand for getting down to bed rock, and have ordered a larger pump to be operated by electric power.

Sheba—This mine, on Patterson creek, N. E. Graves, superintendent, after lying idle two years, is developing well. A large vein of good ore has been found.

Taylor Lake—This mine, 12 miles from Etna, is being extensively developed this summer. The mill is kept steadily running.

Highland—This mine, at the head of China gulch, Salmon river section, continues to yield rich bunches of specimen ore.

Lanky Bob—The new owners of this mine are erecting a stamp mill and a crew of men is developing the orebody.

TUOLUMNE COUNTY.

Rising Sun and Sonorita—Ora B. Rising, of East Oakland, has sold to Wm. H. Mansfield, of Carters, a half interest in these mines and mill sites and improvements situated at Arastraville.

App Mining Company—George W. Ade, trustee of this mine, states that there is no truth in its reported sale for a million dollars. A 25-drill Ingersoll-Rand air compressor has been ordered.

Ida Klein—Rich ore has been found in this mine near Stent. The owners are J. W. & W. F. Lyon and L. Baum. The strike is near the surface.

Keltz—A one-half interest in the Keltz mine and mill site, Kelvin mine and mill site, north extension of the Keltz mine, and Keltz water ditch has been sold by Wm. Sharwood to Dudley Baldwin, of Cleveland, Ohio.

TRINITY COUNTY.

Boulders—Machine drills have been installed at this mine. Development will be prosecuted with greater speed, and the long working tunnel, to tap the main ore shoot, will go ahead about twice as fast as heretofore. The tunnel is 550 ft. and is to tap the quartz ore 800 ft. lower than the upper workings.

Peoples Gold—This company was formed to work the Three Peaks mine, upon which there is a 10-stamp mill. It will drive the "mill" tunnel, and expects to cut all veins within 400 ft. The largest vein on the property is 27 ft. wide in the lowest level, and the ore is fair grade.

COLORADO.

LAKE COUNTY—LEADVILLE.

Penrose—Electricity is gradually being installed in all of the large mines in the camp, the last to utilize it being the Penrose and Coronado. From the lower level of the Bison a steady stream of water flows to the Penrose shaft; this water is now piped to the 750-ft. level of the Penrose, where a 12-in. Pelton wheel generates sufficient electricity to supply 45 lights. This does away with the use of oil. A large Pelton wheel has been ordered for the lower level of the Penrose and will supply light for the long drift connecting the Penrose with the Coronado. The pumps at the Penrose are throwing 1700 gal. of water per minute, a decrease of 800 gallons.

Crescentia—As work proceeds on the new strike the ore channel widens and the values are slightly on the increase; the end of the ore-shoot has not been reached yet, and no attempt has been made to ascertain the hight of the orebody. The mine is shipping from development work alone in the neighborhood of 1000 tons per month. Searching for the Rubie ore-shoot in the eastern part of the property progresses steadily.

Tucson—The opening of this body of ore is being carried on from the 840-ft. level, and drifts and raises are being run in many directions, blocking out the ore. When this work is completed the mine will be in a position to ship 750 tons daily; the present output is about 150 tons. The ore is iron, copper, lead and zinc sulphides,

and is similiar to that of the North Moyer; the Tuscon is the eastern extension of the latter. The mine is making about 750 gal. of water per minute, which is raised to the 550-ft. level and then sent to the Yak tunnel through a raise.

Lou Dillon—This property has been leased by McLellan and McInnis, who intend to sink the shaft another lift of 100 ft. from its present depth of 200 ft. The property adjoins the Helena, Iowa gulch, and the lessees expect to catch the Helena ore-shoot.

Little Jonny—This property still continues to surprise by the richness of its ore. A set of lessees at No. 2 shaft during the week opened a pocket of ore from which 400 lb. of nearly pure gold was taken, one nugget weighing 18 lb. and 95 per cent. of it was pure gold. At No. 3 shaft another set of lessees took out 12 sacks that netted $200 per sack. There are 73 sets of lessees at work on the four different shafts, employing 350 men, and shipping 7000 tons of ore per month, the lowest grade of ore shipped being $30 per ton.

Louisville—The electric hoist and pumps have been installed at this property at the lateral run from the Yak tunnel, which cut the shaft at 650 ft. The flow of water is heavy but will be under control this week, when work will be started to clean out the lower workings.

Lake Park Creek—At present considerable work is being carried on in this district and the Hap Hazard and Laplander are shipping some high-grade ore. The Ida May shaft is down 75 ft. and from the bottom a drift was started into the hill. After driving a few weeks a good body of $30 sulphide ore was caught on the footwall.

Lord Byron—Lessees on this property in Iowa gulch sunk a new shaft and struck a body of ore that runs 17 oz. silver, 29 per cent. zinc and 7 per cent. lead. The new strike will be opened and then the shaft will be sunk deeper. The Kittie, adjoining the Byron, caught another ore-shoot at the same depth and the values are about the same. This is the first time that any zinc has been found in paying quantities in the gulch.

Winnie—From the rich streak of ore recently opened in this property, which belongs to the New Monarch Mining Company, a carload was sent to the smelter at Salida during the week; the ore runs from 15 to 56 oz. gold per ton.

SUMMIT COUNTY.

Wilson—George Hammerschlag, who has operated on Farncomb hill for many years, struck a 6-ft. body of high-grade gold ore in the Wilson property, which adjoins the Wire Patch. The ore is quartz and black iron.

North American Placer—This ground, owned by the American Dredging Company, on Swan river, has been taken under a bond by Ben. S. Revett. Three churn drills are now sinking test holes to bed rock, and when the richest channel has been located the Bucyrus dredge will be put to work.

Swandyke—At this camp, Ed. Graw & Co. shipped 30 sacks of gold ore from a partially developed prospect and got returns of over $300 per sack.

Wilfley Mine—This old producer, at Kokomo, is building a new calcining furnace in connection with its mill and other reduction works. It has been found that, by roasting the products of the Wilfley concentrating tables previous to submitting them to the magnetic separator, much cleaner and higher-grade products can be obtained.

Lenawee Tunnel—This company has its new mill running on ore from the Fisherman mine, which it now holds under lease. The Fisherman mine has been a shipper of high-grade lead and zinc ores for many years and has large quantities of mill ore opened up in its main tunnel. This ore assays about 20 per cent. each of zinc, lead and iron, and carries 8 to 10 oz. silver and $6 in gold per ton.

Argentine—The extension of railroad communication with Denver to Argentine, by the opening of the Wilcox electric railroad, has a tendency to open new territory on Argentine pass.

Waterloo—This mine is now in active operation once more and a vein of zinc ore, carrying lead and silver, measuring from 10 to 12 ft. wide has been opened up.

Rothschild Tunnel—This tunnel is steadily pushed ahead with machine drills and is now in over 3600 ft. It has cut a rich vein of ruby silver at a depth of 2400 feet.

Pennsylvania—This mine is keeping up a steady production of shipping ore and concentrates, which are loaded at Keystone and shipped to Leadville and Denver via Breckenbridge.

Wellington—The last strike made on this mine proves of greater importance than at first shown. A vein of ore, 5 to 8 ft. wide, running over 30 per cent. zinc, has been struck.

Summit Banner Placer—This company, operating in Iowa gulch, has had a most successful season. The year's workings have shown a considerable profit over expenditure, despite the fact that a lot of dead work has been done. A dividend will be paid.

Robinson—This old mine at Robinson, in the Ten-mile cañon, has just been leased by the International Mining Company, which is now installing a new plant. It has erected new buildings, and is sinking a three-compartment shaft, which is already down 100 ft. Drifting and stoping will not be begun until the shaft is down 1000 ft. This is giving a general impetus to the whole section, and promises to revive the camp to its old-time activity.

Felicia Grace—The big ore shoot recently struck in this property at Kokomo has been sufficiently developed to prove it permanent. The management intends to sink the main shaft 225 ft. farther, to hit the second contact.

INDIANA.

PIKE COUNTY.

Hartwell—The Potoka Valley Coal and Coke Company, with headquarters at Hartwell, has under construction near Augusta two tipples, to control the output of two mines which will give employment to 200 miners. The new mines are connected with a branch of the Southern Railway by a motor line, and motors will be used in the mines. The mines will also be lighted by electricity. At Blackburn, the S. W. Little Coal Company, of Evansville, has opened a new shaft which will give employment to 175 miners. It is the only place in the county where mining will be done by machinery.

WARRICK COUNTY.

Booneville—Coal has been discovered in the northeastern section of Booneville. The vein is 5 ft. thick, and is what is known as the surface vein. It is excellent fuel. It was discovered in a brickyard at the bottom of a hole 30 ft. deep. The brick works began immediately to use the coal for power and for burning brick.

MICHIGAN.

IRON ORE—MARQUETTE RANGE.

Ishpeming—The Cleveland Cliffs Iron Company is to explore for ore in the heart of Ishpeming city, in an attempt to connect the lenses on the two sides of the town. It is considered quite possible that explorations will show a continuous body of ore running under the city, in which case a shaft will be sunk in the center of town, near the site of the old Braasted hardware store.

KEWEENAW COUNTY—COPPER.

Keweenaw Copper Company—The diamond drills will be moved to the Empire tract, east of Mosquito lake, as soon as the cross section of the Mandan-Medora tract is completed, which will be within a very short time. The Medora shaft is now bottomed at a depth of 15 ft. in the Medora lode, or a total depth of 40 ft. It has two compartments, and with the new equipment it is expected that sinking can be carried forward at the rate of 90 ft. a month. Two drills are in commission. Contract will be shortly awarded for the erection of a number of dwelling houses at Mandan.

ONTONAGON COUNTY—COPPER.

Mass Consolidated—A new shaft, known as D, and located 1400 ft. south of C shaft, has been started. The latter is opening promising ground in the direc-

tion of the new shaft, and therefore the outlook for its opening good ground is bright. It is sinking on the Knowlton lode. Rock shipments average 350 tons daily from the C shaft. After Sept. 1, when the Michigan releases one head in the Mass mill, the Mass will double its production, stamping 1000 tons of rock daily.

Michigan—Arrangements are being made for the construction of a railroad spur to C shaft. It will be built one-half mile from the main line by the Mineral Range railroad. Plans are being made for a permanent shaft and rock-house at the C shaft. It will be similar in construction to those that will be built at the Centennial and Franklin Junior mines, being of the circular type. C shaft is sinking in the Calico lode, and from that formation crosscuts are driven to reach the Branch vein. The Michigan is opening its most promising ground in the drifts eastward from shaft B and extending toward C shaft.

Victoria—Permission to construct a dam across the west branch of the Ontonagon river near the mouth of Lake Gogebic has been granted to this company by the board of supervisors of Ontonagon county. Chief Engineer Sholtz has left for the site of the proposed dam with a crew of surveyors.

MINNESOTA.

MESABI RANGE.

Rogers Iron Company—This branch of the Buffalo & Susquehanna company recently took over, on option for lease, a tract in the northeast part of section 22, T 57-22. It had been shown to contain some 2,500,000 tons of low-grade, washable ore, and 50c. a ton was the royalty on 100,000 tons a year. Explorations since the option was taken have increased the tonnage, until it now looks as though the mine might contain at least 6,000,000 tons.

Yawkey Lands—In section 9-58-16, Mesabi range, about a mile southwest of the big Biwabik mine, M. L. Fay has developed about 1,000,000 tons of merchantable ore on ground that has been more or less explored. It is a part of what is known as the "Yawkey Lands," and is surrounded by other tracts owned by the same interests and by properties of the Oliver Iron Mining Company. This discovery serves to connect the well known Biwabik orebody with that centering about McKinley and Elba, and is of some interest from this fact.

Cleveland Cliffs—This company is operating six diamond drills close to Little Lake station, at Swanzey; it is said to have made valuable discoveries of ore, which will be opened another year. The same company, as well as the Oliver, is drilling all around Negaunee and Ishpeming, and the plans that have been made for development in that basin by these two concerns are very far reaching and thorough. There is a considerable stretch there that deserves careful exploration.

Mountain Iron—Some 800 men are employed at this mine by the Oliver company, and the production for the year to date exceeds 2,000,000 tons, all of which has been mined and moved since April 1. The mine does not show the enormous tonnage taken out of it this year, and will be good for a large business next year, though with possibly some stripping and development.

Prince of Wales—This shaft has been enlarged nearly to the bottom, and will be pushed to a total depth of 750 ft. The remaining distance is through solid rock and will require some time. The shaft will be an important hoisting avenue for the Regent group, which is operated by the Oliver Company, though owned jointly by it and the Cleveland Cliffs Company. The Prince of Wales portion of the group has been idle for some years.

Rolling Mill Mine—Sinking of the large new shaft will be continued to 800 ft., when drifting will be undertaken. Several buildings are being erected for engines, boilers, etc., for large-scale operations. This mine was for years a small low-grade high-silicon property, but deeper exploration has proved it a large and valuable mine. The shaft is being equipped temporarily with cages, but ultimately skips will be used.

VERMILION RANGE.

Ely—An important exploration is soon to begin on the Vermilion range, about one mile southwest of Ely, by Swallow & Hopkins, who have done some work on that range during the past few months, and have ample capital to carry on extensive and costly developments. They are associating three properties, the Anderson, Lucky Boy and Camp, on all of which more or less work was done years ago, and will drill and explore them with great care. These properties lie in the northwest corner of T 62 R 12, in sections 4 and 5, and what ore exists there is not supposed to have any connection with the Ely trough, but to be a separate body, with a north-northeast trend; the outcrops of Soudan formation and greenstone seem to bear out this supposition. The region is swampy with ridges of greenstone, which are nearly continuous, rising from 20 to 30 ft. above the valleys. Most of the pits and trenches in this district show mixed ore and red slate or schistose greenstone. Some of the pits showed good red hematite ore. The first work in this immediate location was done by the Anderson Iron Company in 1890, two years after the discovery of the Chandler mine. The Anderson has a vertical shaft on the northern ½ of the northwest ¼ of section 4, put down at that time, together with a number of trenches and pits. These showed very nearly the same indications of ore as were first found at the Chandler, which resulted in the discovery of the vast deposits of the Ely trough, with its Chandler, Pioneer, Zenith, Sibley and Savoy mines. These indications were: red earth, occasional nodules of high-grade hard ore, and some soft hematite of varying purity.

Other Exploration—More or less work is in progress on other parts of the Vermilion range. One drill has been at work in section 4 T 62 R 13, near the old Southall mine, owned by the Oliver company. The Oliver company has stopped working on 9-62-13, and has taken out its drills. Some work which has been under way near Tower, for a long time, is still going on. The White Iron Lake Iron Company, which has been drilling rather continuously for some years on the shores of White Iron lake, a few miles southeast of Ely, is now sinking a shaft. Operations of the Midland Steel Company, which has taken over the Shagawa Iron Company's option on section 30, two miles east of Ely, is confined, and will be for many months to come, to sinking and drifting in search for extensions of the orebodies already found.

CASCADE RANGE.

The new Empire mine, a low-iron, high-silicon proposition of great tonnage, is to be developed for milling, and will be in shape to produce a large tonnage another year. The shaft is down 120 ft., and a number of raises will be driven up to the surface from laterals, the ore being milled down to laterals for tramming to shaft and hoisting. There is but about 4 ft. of surface over most of the orebody, which has been proved 800 ft. wide across a whole 40-acre tract, or about 1320 ft. The depth is considerable.

MONTANA.

BUTTE DISTRICT.

Coalition—A 7-ft. vein of 7 per cent. copper ore has been opened on the 1500- and 1600-ft. levels in the Cora mine and will be cut on the 1400. This vein was lost by United Copper, which formerly owned the mine. About 100 ft. from the point at which the north crosscut met the vein on the 1600, a fault was encountered and United Copper followed it west, with the result that the vein was lost on the three levels. Coalition made an opening at right angles with the vein near where United Copper lost it on the 1600 and picked it up only a few feet distant. At the point of intersection, the ore carried only a small percentage of copper, but 30 ft. ahead it merged into 7 per cent. and carried 2½ oz. silver per ton. The vein was then cut on the 1500 by the same course. This vein is now the best in the mine, but sinking is progressing. The shaft is more than 2200 ft. deep and is to be sunk 130 ft. more, which will bring it to the 2200 of the Diamond. A connection between the two will be made at the bottom and the water from the Cora turned over to the Diamond. All veins

in the Cora will then be crosscut and opened.

The shaft on the Tramway is down more than 400 ft., and is going at the rate of 5 ft. a day. Through this opening, the Tramway, Snohomish and Minnie Healey mines will be worked. The latter is closed now by a squeeze in the shaft. The company is re-timbering 28 sets between the 200 and the surface.

Amalgamated—Two of the large producers of this company are closed for repairs, Mountain Consolidated and West Colusa. The latter yields 32,000 tons of ore a month when in operation, but this has not been entirely cut off, for 400 tons a day are coming through the shaft of the St. Lawrence. The output of the Mountain View has been increased from 900 to 1300 tons a day. All other mines of the company are producing to full capacity, with an addition of 200 tons a day from the Poulin and Picific. The Washoe plant is receiving about 8000 tons of ore a day and the Great Falls plant 3700.

North Butte—Shipments from this property aggregate between 1000 and 1100 tons a day. Pockets have been placed on the 1200-ft. level to facilitate the operation of the skips, but those on the other levels will not be ready for use until the last of the month.

New Companies—Some of the companies organized recently are doing good work. East Butte Extension is raising ore through three of its shafts, having struck 4 ft. of 6 per cent. copper in No. 5 yesterday. Butte & Bacorn has its three shafts below 300 ft., and is making better headway than formerly. It has struck a little copper ore in one. Butte Copper Exploration is down 850 ft., and will crosscut at the 1000, which it expects to reach before Nov. 1. Lewisohn General Development has cut two veins on the Montgomery, one 3 ft. wide and the other 1 ft. The ore is silicate of copper. Butte-Milwaukee has struck the apex of a shoot of copper in an old drift 250 ft. deep; it will go deeper and catch the ore. Ida-Montana, composed principally of Michigan men, is preparing to equip its property with a large hoisting plant.

NEVADA.

ESMERALDA COUNTY—GOLDFIELD.

Portland Mine—The latest strike has been made on the Portland at a depth of 425 ft. The ore is identical with that of the Mohawk and goes to prove that this vein extends at least a mile and a half south of the Mohawk ground. The depth at which the ore was struck is significant and will give an impetus for deeper work throughout the entire district. The ledge seems to be 30 ft. wide and this entire body averages about $75 per ton.

Mohawk—The leasers are all at work and production is increasing. On the Frances-Mohawk lease—the latest strike on the Mohawk ground—the orebodies are increasing in size as well as in value. Regular shipments are being made and dividends should be forthcoming soon. The Hayes-Monnette, Oddie, Truett and Kalfus leases are making regular shipments.

Jumbo Extension—A strike has been made on the Higginson lease in a winze from the 120-ft. level and the ledge varies from 5 in. to 3 ft. and assays from $300 to $1800 per ton. Shipments will be made soon.

Florence—Several leasers are at work who have developed shipping ore and the company is making test for treatment; as soon as the proper plant is decided upon a reduction works will be installed.

Red Top—While the management is criticized here for not rushing production and development, it is progressing favorably and is about ready to continue its shaft to 500 ft. A 50-h.p. electric hoist has arrived, also pump, and work will be rushed.

Velvet—Leasers are at work, and large bodies of ore have been developed on the 100-ft. level, and they believe they have got the orebody that yielded such good returns a year and a half ago.

Atlanta—The leasers are progressing, and on the Woodward & Gaskin lease, at a depth of 210 ft., have passed through a vein 4 ft. wide, averaging $17 per ton.

Goldfield Madonna—Development work continues. Workers are developing a large body of ore, and it appears they have the same class of ore as the Great Bend.

Ore Shipments—Ore shipments from Goldfield for the week ending Aug. 18 were 1048 tons, divided as follows: Combination leases, 240; Oddie lease, 158; Hayes-Monnette lease, 420; Kalfus lease, 150; Frances-Mohawk, 80 tons.

For the week ending Aug. 25 the total tonnage was 1329, something over 44 carloads. The amounts were divided as follows: Hayes-Monnette lease, 630; Combination, 347; John S. Cook & Co., 30; Columbia sampler, 120; Gardner lease, 50; Frances-Mohawk lease, 40; St. Ives, 30; Florence, 30; Oddie lease, 52 tons.

Shipments will undoubtedly be materially increased in a very short time. At present most of the leasers and mining companies are devoting their energies to blocking out orebodies.

EUREKA COUNTY.

Richmond-Eureka Mining Company—Development work in the mines of this company is progressing rapidly, but the lowest levels of the old workings have not yet been reached. Shipments are already being made to the smelter of the United States Mining, Smelting and Refining Company, near Salt Lake City, Utah. The latter company owns 45 per cent. of the capital stock of the Richmond-Eureka company.

NYE COUNTY—MANHATTAN.

Little Grey—Development work has been done to a depth of 165 ft., and has exposed over 1200 tons of ore averaging $25 per ton. The owners propose erecting a crushing plant as soon as they can get the machinery on the ground.

Jumping Jack—A 5-ft. vein carrying high-grade ore has been cut in No. 2 shaft in this mine. The ore shipped from the mine last month netted the owners a profit of $15,000; the next shipment will be richer.

Desert Queen—A continuation of the rich Paymaster vein has been cut in the Desert Queen shaft. The ore is expected to average $125 per ton.

NYE COUNTY—TONOPAH.

Montana—The Montana-Tonopah Company is calling for bids for the supply and erection of a 40-head mill. The mine has a large dump of milling ore, and there is enough ore in the stopes to keep a mill running for several years.

Gipsy Queen—This property, which adjoins the North Star on the north, is being reworked. The shaft has reached a depth of 235 ft. Lately some quartz stringers carrying small values have been cut. At greater depth the management expects to strike some of the rich veins developed in the North Star and Montana mines.

California—Quartz stringers have been cut in the 450-ft. level in this mine which have encouraged the company to put on another shift to expedite development work. It is expected that one of the Belmont or Valley View veins will shortly be encountered.

WHITE PINE COUNTY.

Nevada Consolidated—It is expected that the railway will be completed to Ely by Sept. 29. The company intends to erect its smelter at Duck Creek, 14 miles northeast of Ely.

OREGON.

BAKER COUNTY.

Mayflower—Manager D. B. Stalter, of the Heppner Mining Company, owning the Mayflower group in the New El Dorado district near Sumpter, reports that they now have 1000 ft. of tunnel, and two shafts that give access to their free-milling ore. The company has decided to erect a ten-stamp mill on the property. Sufficient ore has been blocked out to keep it busy.

Yellow Jacket—F. M. Stanley has just located four claims and purchased four others in the new silver camp, eight miles west of Baker City. The quartz carries free gold, and the copper sulphides appear to be rich.

Chickopee—J. W. Buckley, owner of the Chickopee mine, 16 miles west of Baker City, and joining the new Bishop silver strike, has broken into the same grade of

rich ore, and has just shipped five tons to the Sumpter smelter for reduction. The ore assays high in silver and lead, and carries some copper and gold.

PENNSYLVANIA.

ANTHRACITE FIELDS.

Centralia—The citizens of Centralia have raised $1000 for taking legal action against the Lehigh Valley Coal Company, which threatens to ruin their homes by removing the mine pillars. Arrangements have been made for a mammoth meeting to be held Sept. 5, at which time the borough council will be requested to take action in the matter by adding, out of the funds of the municipality, to the fund already subscribed. Prominent lawyers from other towns will be requested to be present.

North Franklin—After having been on strike for nine months, men in the North Franklin colliery have returned to work. The trouble grew out of a difference as to the price for mining coal, the company contending that 50c. a wagon was sufficient, while the men held that it should be at least $1.25 a wagon. A compromise was effected.

Tuscarora—The Mary D. colliery, at Tuscarora, instead of closing down for good, promises to be one of the most prosperous in the anthracite belt. The old breaker, which was burned, is to be replaced by a new one, and premiums are being offered if it is constructed before Oct. 1. J. S. Wentz & Co. operate the colliery.

Tamaqua Hospital—Miners and business men in Tamaqua and the Panther creek valley are enthusiastic over a plan to erect a hospital close to a number of collieries. The miners of the Panther creek valley, of whom there are at least 1000, have all agreed to give one day's pay to the institution, and it is possible that the employees of the Philadelphia & Reading Company will do the same thing. The business men have already subscribed $1500 to the fund.

Enterprise—The Enterprise colliery at Shamokin, which is owned by W. L. Connell & Co., of that city, and which has been idle for more than a year because of a mine fire, has resumed operations. Three hundred men and boys have been given employment.

Beaver Brook—With a recently completed washery on their hands, C. M. Dodson & Co., operators of the Beaver Brook colliery, can't operate it because of the scarcity of labor. There was never before such a scarcity of labor as has been this summer.

Minersville—The new breaker at Pine Hill colliery was given a trial run Thursday. It was built to replace the old one, burned early in the spring, and it is of entirely original construction, the lower part, up to the chutes, being of reinforced concrete. The machinery is of the very latest design.

Lehigh & Wilkes-Barre—All collieries of this company will resume work Sept. 10. They have been idle for more than a week, owing to a lull in the trade.

Port Carbon—At the new mine near Green's pond, a short distance east of Port Carbon, opened by Slatterty Brothers, sinking has been under way for the past two years and the operators claim they have opened several veins of the very best coal. Work has already begun on an up-to-date breaker.

IRON ORE.

There is a possibility that iron-ore mining in the northern part of York county, Penn., may be renewed on an extensive scale. The properties of the old York County Iron Company will be sold with all leases, etc., by a trustee to be named by the courts. Hematite ore is being produced for various Pennsylvania interests in a number of places. The Mt. Holly Brick and Clay Company has opened several shafts near Mt. Holly Springs, and the Juniata Furnace and Foundry Company is working banks near Dillsburg. The banks have been practically idle for several years.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Hidden Treasure—The annual meeting of this company was held Aug. 23 and the following board of directors was elected: S. V. Cochrane, R. S. Grimes, Dan Anderson, Nate Hart and J. B. Conant. The concrete foundations for the new plant are completed and all machinery but the air compressor has arrived. The new hoist and the 50-h.p. gasolene engine are being installed. The shaft is 200 ft. deep and will be sunk another 200 ft. before further development work is done.

Gold Eagle—A force of men will be put to work next week on this property; in the Garden City district, adjoining the Maitland, assays recently made show very rich rock and the work of sinking a shaft will be begun.

Esmeralda—Some new machinery for this mill has just arrived and will be put in place at once. From 35 to 40 tons of ore are being treated daily and the ore is steadily increasing in value. The property is operated by Ed. Majors, who has it under lease. After the next clean-up the mill will be closed down for a day or two while the new machinery is being put in position.

Homestake—Some of the filter presses are now being put in place at the slimes plant which this company is building at a cost of $500,000 in Deadwood. Six have already been received and the rest are being made at the company's machine shops at Lead. A tunnel has been run 130 ft. into the hill and the work of cutting a raise has now begun. This will be about 100 ft. and will connect with the spur from the Burlington railroad. Large coal bins will be built at this point. All the concrete platforms for the 26 presses have been built. It is thought that the plant can be put into operation early in December. The special feature of this mill is the automatic sluicing device patented by C. H. Merrill, of the Homestake.

Safe Investment—Most of the machinery for the 60-ton mill has arrived, and will be installed at once. The framework of the building is practically completed, and a test run will be made in a few weeks.

Minneapolis Mining Company—Work of grading will begin this week on the company's ground near Garden City, preparatory to erecting a 200-ton cyanide plant. Development is still going on and large bodies of cyaniding ore of good grade have been opened up. It is hoped to have the mill under cover before cold weather.

Imperial—The annual meeting of this company was held this week, and reports showed good conditions. During the past year, over 51,000 tons of ore were treated, and more than $250,000 of bullion produced. On the Baltimore claim, an orebody 9 ft. thick has been opened. On the Dolphin group two shoots, one 75 ft. wide and the other 150 ft., were cut. The tonnage at the mill for the past year has been increased 10,000 tons. The following board of directors was elected: W. W. Jamison, J. S. Beacom, of Greensburg, Pa.; M. J. Gallup, Mt. Jewett, Pa.; A. J. Cochrane, Dawson, Pa.; M. Hirsh, R. S. Jamison, and W. S. Elder, Deadwood.

Golden Crest—A number of surface improvements are being made on this property. The mill is running at its full capacity, treating from 40 to 50 tons of ore daily. The sands are handled by leaching and the slimes by decantation and agitation.

PENNINGTON COUNTY.

Holy Terror-Egyptian—At the annual meeting, the following trustees were elected: Charles Morgan, William Arthur Babson, New York; J. F. Fort, Charles A. Clark, New Jersey; O. O. Roberts, Hon. Richard W. Irwin, New York; and Wm. Collins, South Dakota. The hoisting engine from the Holy Terror plant has been moved to the Egyptian, and the whim that was there disposed of.

Ideal—About 20 men are employed, working two shifts, running a tunnel into Sheep mountain. The company is also building a good road down Iron creek, which will mean much to mining in this section.

Golden West—A force of men is at work upon a ledge which is now 50 ft. wide, with no walls as yet. The 100-ton Chilean mill is running at about half its capacity. The present saving is a little over 1 oz. amalgam to the ton. The

new officers just elected are: Charles E. Curtis, president; A. A. Keith, secretary-treasurer; E. J. Kennedy, general manager.

Dakota-Calumet—Work is carried on below the 300-ft. level, and a three-compartment shaft is being sunk on the ledge. The ore runs up from 7 per cent. copper, and about 200 tons of ore averaging 25 per cent. are on the dump. There are 30 men employed.

Mercedes—Alfred Filion, of Lead, has been appointed receiver of this company. A large amount of new machinery has just been purchased by the company and it was the intention to sink the shaft to the 200-ft. level and then prospect further.

CUSTER COUNTY.

Lillian Belle—At the annual meeting just held, the following officers were elected: W. M. Whitsell, Oklahoma City, president; C. E. Smith, Custer, vice-president; W. H. Palmer, Jr., secretary-treasurer; Charles Harbach, superintendent.

TENNESSEE.

Tennessee Copper Company—The August production of this company was 1,250,000 lb. of copper. It is expected that the output in September will be 1,500,000 pounds.

UTAH.

BOX ELDER COUNTY.

Century Gold—The mill and mine of this mining company, in the Park Valley district, are in operation.

JUAB COUNTY.

Tintic Ore Shipments—During the week ending Sept. 1 these aggregated 128 carloads, the shippers and amounts being: Grand Central, 6; Victoria, 3; Carisa, 10; Mammoth, 7; Star Consolidated, 1; Black Jack, 1; Ajax, 2; Bullion Beck, 9; Gemini, 10; Centennial Eureka, 39; Scranton, 5; Dragon Iron, 8; Swansea, 4; Uncle Sam Consolidated, 8; Eagle & Blue Bell, 2; May Day, 3; other mines, 4.

SUMMIT COUNTY.

Jupiter—Ore is being shipped by this company, near Park City, which averages between $45 and $50 per ton.

Thompson Mining—This company will probably renew development, by arrangement, through the Daly Judge mine. J. D. Wood, of Salt Lake, is manager.

Uintah Treasure Hill—Several feet of commercial ore have been opened in an adit. Assays up to 100 oz. silver have been obtained.

Daly—An important strike of ore has been made on the 120-ft. level at Park City.

SALT LAKE COUNTY.

Ohio Copper—At the annual meeting of shareholders of this company, operating in Bingham, a bond issue of $650,000 was authorized after the passage of a resolution permitting it. The proceeds are to be used in the development and equipment of the mine and improvement of the mill. A new hoisting plant, to operate to 2500 ft., will be installed. The officers chosen for the ensuing year are: N. J. Catrow, president; A. J. Bettles, vice-president; Henry Catrow, secretary and treasurer; Thomas Weir, manager, who, with J. S. Gard and J. H. Friend, are directors.

Bingham Consolidated—The management says that the output from the mines of this company during August aggregated 16,000 tons.

Alta St. Louis—Negotiations are pending for the purchase of this mine at Alta by the City Rocks Mining Company, which will give the latter an excellent tunnel site.

Alta Quincy—This company at Alta has been turned over to Tony Jacobson and associates of Salt Lake. An initial payment of $15,000 has been made.

TOOELE COUNTY.

Honerine—It is reported that experts have been examining this mine at Stockton in behalf of W. A. Clark.

WISCONSIN.

ZINC FIELDS.

Northwestern Lead and Zinc Company—It is the intention of the management to install, as soon as possible, a magnetic separating plant. The Northwestern was one of the plants built several years ago before the ore had been sufficiently developed to supply it.

Iowa Mining Company—The compressor equipment will soon be ready for use. The new shaft is down 50 ft. It was in one of the drill holes on this property that a large body of ore was drilled into.

Murphy Mining Company—After several years of development one of the most complete plants in the entire district is being installed by the Galena Iron Works. An Ingersoll-Rand return air system may possibly be used in unwatering the mine.

Hoskin Mine—The work of overhauling the old Hoskins property will be completed within a short time. As soon as the pumps have unwatered the mine, the method of working the ground will be determined. It is reported that the old Missouri method, formerly employed, will not be followed. The Kennedy mine adjoining will be mined by the retreating method as soon as the edge of the lead is reached.

Mifflin-Linden Mining Company—The rich body of zinc and lead ore, discovered early in the summer on the old Mason property near Linden station on the Mineral Point & Northern Railway, is being proved. A large quantity of extremely rich ore is being raised as the development work is carried on. This new mine belongs to the Mineral Point Zinc Company, which has been operating the Mason mine. It is the intention to arrange a tramway so as to connect with the Mason mill. This new strike promises a longer life to the old Mason property, which has been worked for nearly 50 years, the new run of ore being on an entirely new range which has never been worked before.

West Main Street Mining Company—Lead is being taken out of the shaft on the Stevens property in the west part of the town of Platteville. It seems that the city of Platteville is built over a big range.

Foreign Mining News.

CANADA.

ALBERTA.

Peace River—Gold has been discovered in this region. The Government survey party under Mr. Macdonnell, which has just arrived at Edmonton, brings samples from a point on the Peace river, 37 miles below Fort St. John. They consist of slate and shale freely interspersed with small specks of gold. It is supposed that the gold-bearing deposit is of considerable extent. A rough assay showed from $7 to $32 per ton, but it is supposed that a correct analysis will reveal higher values. A number of claims have been staked.

IRON AND STEEL INDUSTRY.

Dominion Iron and Steel—This company is extending its operations. The open-hearth plant had a record month in August with an output of 22,000 tons. The importations of ore for the month aggregated 148,000 tons, most of which came from the company's mines at Wabana, Newfoundland. They also imported 38,000 tons of limestone.

Algoma Steel Works—This plant at Sault Ste. Marie made a new record in August, turning out 17,865 tons of steel rails. The record output for 24 consecutive hours was 1004 tons.

BRITISH COLUMBIA—BOUNDARY.

Snowshoe Mine—Chas. Biesel, manager of the Snowshoe mine for the lessee, the Consolidated Mining and Smelting Company, of Canada, is gradually finding room for more men in the mine as the water is lowered. He now has about 40 employed, having put on a night shift as well. The larger air compressor—the high-pressure half of a 30-drill Rand-Corliss compound engine—is now in use. Ore is being shipped to the lessee company's smelting works at Trail.

BRITISH COLUMBIA—CARIBOO.

Slough Creek—The Slough Creek Gravel Gold, Ltd., reorganized and registered in London, England, as the Slough Creek, Ltd., is employing 36 men (including 12 Chinese on the surface, underground men all being white) at its deep-drift mine on Slough creek. The *Ashcroft Journal* states that slow progress is being made in re-timbering the drain tunnel through caved ground, but this is being pushed ahead steadily.

The mine shaft-house is being enlarged to house more steam boilers ordered. Other additional equipment includes an engine with 16x36-in. cylinders and a direct-acting hoist with 7-ft. drum.

BRITISH COLUMBIA—ROSSLAND.

Le Roi—The Le Roi Mining Company will next month resume smelting at its works at Northport, Wash. These works were closed down about a year ago, the directors then in charge having imagined that the company would save money by having its ore treated at the Trail smelter rather than at its own works. A contract calling for the delivery to the Trail works of the output of the Le Roi mine for three years was entered into without the advice of the company's managers. When Anthony J. McMillan was again given the general management, he set about to cancel the contract, to which both parties have now agreed. The Le Roi company will deliver 60,000 to 70,000 tons ore during the months that will elapse before the Trail smelter shall have arranged to obtain a sufficient supply from other mines—chiefly its own, which are enlarging their output. Both Mr. McMillan and the manager of the Northport smelter are satisfied the company will do better by smelting its own ore.

ONTARIO.

Nipissing Mine—A vein of silver discovered a few weeks ago near working vein 25, on the Nipissing property, at Cobalt, has shown wonderful richness when stripped and followed. It gradually widened until it was found to measure fully 5 ft. at the widest part. It has been followed for over 100 ft., the width varying from 5 to 2 ft. A massive nugget of 800 lb. was taken out which contained about 70 per cent. silver according to careful estimates.

This company owns 846 acres of mineral land. In less than 18 months of actual operation, over $1,400,000 worth of ore has been shipped from the property, at a total expense (including machinery and equipment) of less than $200,000. Of the profit $400,000 was distributed before the Nipissing Mines Company acquired the property in April of this year. These results have been produced from open cut workings. Less than 10 per cent. of the company's holdings have been deforested, and only a small portion of this area has been thoroughly prospected. The shipments of ore thus far made show an average assay of 2300 oz. in silver, 8 per cent. cobalt and 5 per cent. nickel. This ore has been produced from veins averaging between 2 and 9 in. in width. Several of the workings have reached a depth of over 50 ft., and carry their values and widths at the bottom. On an adjoining property a shaft has been sunk on ore to a depth of over 200 ft., showing a permanent vein and continued values. Forty-eight veins have been discovered to date on the Nipissing property, although only a portion of them have been opened. Last week the manager reported the discovery of a new vein from 12 to 28 in. in width, carrying very high silver, which he believes to be the most important discovery yet made in the Cobalt district. One hundred and sixty-five men are now employed upon the property, and this number will be increased to 250 by Oct. 1. The property is now being equipped with a large central compressor plant, which will distribute power to the various workings. Larger hoists and air drills have been ordered, so that in future the property will be operated even more systematically. Several permanent working shafts are being sunk.

YUKON TERRITORY.

The Canadian-Klondike Dredging Company—This concern, operating the big dredge at the mouth of Bear creek on the Boyle concession, has ordered another dredge which, with two ordered some months ago, and the one it has in use, will increase its number of these big gold-saving machines to four. It is not expected that either of the new dredges will be received here this season. The company has been prospecting with four Keystone drills since about the middle of last winter, and it is believed that the pay gravel has been found much more extensive than was known earlier, hence the decision to largely add to the gold-saving plant for handling it.

Yukon Consolidated Goldfields—Good progress is reported at this company's big Twelve-mile ditch. The right of way has been cleared a distance of five or six miles ready for the shovelers. One of the steam shovels has been started on a ridge known as the Mackenzie saddle, the ditch at this place being 15 ft. deep and 15 ft. wide on bottom. During the first afternoon's work this shovel removed about 800 ft. of earth. Included in the cargo of the steamer "Whitehorse," which left Dawson for Twelve-mile landing on the 9th inst., were 270 tons of machinery, much of it electrical apparatus for the power station, including three transformers, each weighing more than 10,000 pounds.

Railway Rates—The inquiry by the Canadian Government railway commission into the question of rates charged by the White Pass & Yukon Railway was concluded today, and the commissioners leave tonight for Ottawa. The decision of the commission, which will be rendered later, will be of the greatest importance to the Yukon. Merchants testified against the railway company, asserting that the falling off in population and the exhaustion of the rich placers make lower freight rates necessary in order to admit of lower grade levels being worked and the prosperity of the country thus assured. President Graves, of the White Pass Company, contended that the railway must have a greater volume of business before rates can be reduced.

Klondike Mines Railway—This will be completed to Sulphur Springs, 31 miles from Dawson, early in September. This will be the terminus of the road for the winter. All told, there are about 350 men at work on the road, the heaviest work on which is done.

YUKON TERRITORY DREDGING.

Bonanza Creek—This field is active, for rains in July and August supplied water for hydraulicking on Bonanza, and the large plants were enabled to operate. The Weinheim plant averaged 12 hours a day with one nozzle, and latterly used two. The White Channel Company was sluicing early in the month with about 500 in. of water in the ditch. The Northwest Hydraulic Company (formerly the Norwood-Fuller Company) and the Anglo-Klondike Company both got to work. On Hunker creek claims that were idle earlier were working full swing. The fall rains have commenced earlier than in most seasons, and if they continue until the close of the season, will admit of at least $1,000,000 more in gold being recovered before winter shall stop work.

Duncan River—The numerous hydraulic miners on Duncan river are eagerly awaiting the return of winter, so that the big pumps supplied by the Dominion Government may be transported to that section, and put to work. They continue to have full confidence in the payable nature of the ground there, and believe that when the pumps shall drain off the water so that a crosscut can be driven, pay gravel of great richness will be made accessible.

Canadian Fortymile—The management of the Canadian Fortymile Dredging Company reported that its new dredge would be in operation before Sept. 1, and would begin digging right at the spot where its machinery has been assembled, making progress upstream under its own steam, and taking the entire bed of the river as it goes along. From another source it is learned that the Moncrieff dredge, which was wrecked last spring in an attempt to take it through the cañon, is lying on a big rock below the rapids with a large hole in the bottom. The machinery, except the boiler and steam winch, has been removed. A new hull is to be built next winter, and the machinery will be taken over the ice to its destination and installed ready for operation in the spring. The small Rutledge dredge is in the slough off the main river; it does not appear to be much damaged.

McLaren-Milvain—Another dredging enterprise in the Fortymile region is that of J. Gordon McLaren and Robert Milvain, who have returned from England, where a close corporation has been organized to work about six miles of the upper end of Walker's Fork in the Fortymile district, the ground having been acquired by purchase from individual claim owners. It is stated to

average about 14 or 15 ft. deep, with 4 ft. of muck overlying the gravel which carries pay all through, down to bedrock. A dredge of large capacity and latest type, with buckets to hold 5 cu.ft. of gravel, has been ordered from the Risdon Iron Works, of San Francisco, Cal., to reach Fortymile next summer, and to be transported thence 75 miles to the company's ground at midwinter, after the ice shall have frozen solidly along that stream.

WHITEHORSE, SOUTHERN YUKON.

Mining Divisions—For the purposes of enforcing the mining regulations in Yukon Territory, the Whitehorse district, as proclaimed in January, 1905, has been divided into two districts, to be known respectively as the Conrad and the Whitehorse. The former comprises all that portion of Yukon Territory tributary to Lake Bennett, Lake Nares, Lake Tagish, and Lake Atlin. The remaining portions of the old Whitehorse district now constitute the newly defined district of the same name. This change took effect on August 1.

White Pass—Discoveries of gold quartz have been made in the Watson and Wheaton river districts, at points from 15 to 25 miles southwest of Robinson siding on the White Pass & Yukon Railway. It is a very accessible district, as one can ride direct to the mines on horseback.

Windy Arm—In this section of the Conrad district, much development and prospecting is being done. In all there are about 500 men employed on some 40 claims, nearly half of this number being engaged in developing the various properties of the several Conrad companies. The question of whether the ore can be more economically dealt with by smelting or by concentration is being carefully looked into. Meanwhile no bulk shipments are being made, but a close record of assay values of the ore mined in the course of development is kept. Good progress has been made with the work of constructing Riblet aërial tramways from the mines to the lake shore. The White Pass & Yukon Railway Company, which has had two different routes for a branch railway surveyed, is delaying construction until the mining companies shall have decided the question of ore reduction—both as to method of treatment and location of reduction works.

Native Copper—A deposit of native copper is reported to have been discovered by M. C. Harris and partners. They found the vein 700 ft. up the side of a steep mountain near the head of White river. At a depth of 10 ft. there is 30 ft. of copper ore between well defined walls. There is some doubt as to whether the claims are in Yukon Territory or Alaska, so they have been recorded in both countries. It is believed, though, that the locality is well within Canadian territory.

Copper Mines—Byron White, of Spokane, Wash., who has for years been operating the Slocan Star silver-lead mines, is opening up the Pueblo and Carlysle copper claims in the Whitehorse district. His principal work is being done on the Pueblo. A wagon road to the Pueblo is being constructed by the Government, and over this the sacked ore will be hauled to the railway.

MEXICO.

OAXACA.

In the Sierra Juarez, much development is in progress, and prospecting is going. The notes given below are all from this district.

La Natividad—Work on this famous old property goes ahead steadily, in spite of the lean streak, which is the portion of all bonanza mines, and will undoubtedly soon regain its record of bonanza output. Work on the 30-stamp addition to its present 20-stamp mill is being pushed to completion. The low-grade ores are abundant. The mine has recently been equipped with electrical machinery throughout, the generating plant of 250 h. p. being one of the most complete in southern Mexico.

El Banco—This mine adjoins Natividad, being its north extension. After some years of dead-work the principal vein of Natividad has been found, some distance west of the shaft, and development work on the vein is well under way. Some good ore has been extracted. Crosscutting west of the Mother vein has resulted in finding the second Natividad vein, also in good values, and development work has been started. The mine is equipped with a hydro-electric plant, hoists and drills.

Cinco Señores—This old property, which consists of some six mines and "antigua" hacienda, has lain idle for some years, due to indisposition of the owners to develop. It was formerly one of the principal producers. The property has recently been given under option and is to be financed by London capital. A small force is now engaged in reopening the mines.

PACHUCA.

Real del Monte—The work of alteration and improvement at this property by the United States Smelting, Refining and Mining Company, is rapidly progressing. It is believed that mining operations will soon be inaugurated on a large scale. Wherever possible, electric machinery is being installed. It is expected that this month will see the large mill in working order, and it is estimated that the production therefrom will be something like 10 tons of silver bullion per month. The intention first was to treat this product at the works, and with that end in view an experimental sulphuric acid parting plant was installed. This plant was unable, economically, to bring the gold up to a grade acceptable to the Mexican mint, so that a contract has now been made with the National Metal Company, for its present treatment at the electrolytic silver and gold refinery in Mexico City, where the silver and gold both are brought up to a fineness of 999.5 to 999.9. The statements are also now being made that the United States company is already so well satisfied with its purchase that an option has been obtained on the Blanca y Anexas mines, adjoining, and by many considered superior to the Real del Monte. It has, for several years past, been paying dividends of $50,000 Mexican per month. This Blanca property is owned almost wholly by Frank Rule & Sons. It is stated that the bond taken on the property is for $12,500,000, but this must be an error, for the stock of the Blanca Mining Company is divided into 12,500 shares, par value $200 Mexican, which are selling today on the market at $660 Mexican per share, making a total of $8,250,000 Mexican; so the bond, if given, cannot be over $10,000,000 Mexican. Should this property be acquired, there is little doubt that the company will establish in the Republic, perhaps in Pachuca or in the City of Mexico, a refinery for the treatment of its silver bullion, when its contract with the National Metal Company shall have expired. There was some talk of this company being associated with the Norddeutsche Raffinerie, of Hamburg, when the latter had its Mr. T. H. Deitz in Mexico last April—mention of which was made in my letter in the JOURNAL of April 28—so it is not known whether the contemplated refinery will be by the United States Company, or in connection with the German company. Its German associations are very intimate, through L. Vogelstein & Co., of New York, and Aron Hirsch & Sohn, of Halberstadt, Germany. And should this company build a smelter anywhere in Mexico, as is its intent, then certainly the refinery will be established. The question of the maintenance and stability of the present monetary law may as yet be cause for hesitancy, as on its workings depend somewhat the profits of the refinery.

SONORA.

Piedras Verdes—The Americans working on this property are reported to have struck recently a large body of high-grade copper ore. There is considerable excitement in the district on account of the new find.

Ronquillo Copper—This Cananea company is to start work on its claims in Ronquillo; they lie adjoining the Cananea Central, close to the Cobre Grande of the Greene Consolidated, and have been prospected more or less in past years, with good indications. The financial outlook for this company and the Calumet & Sonora has been much improved by the entrance of the Cole party into their district.

Cananea Central—Fine showings of copper are being made at the mines of the Cananea Central, 30 miles almost due south of Bisbee. Mr. Lindsay, one of the large owners in the old America, which is now a part of Cananea Central, has just been through the mines, and states that every drift, shaft and prospect hole was in ore of high grade. Two additional shafts are being started on America ground, for the purpose of further proving the immense territory of the company, and these are looking exceedingly well.

Mines Development—The continual heavy dealings in mining properties in Cananea, where are now operating four large copper companies, has had its beneficial effects upon the whole State of Sonora, and from all parts of the State come reports of new work. The Cerro Colorado, or El Porvenir, has been reported sold for $350,000 gold to a New York company, which is preparing to develop on a large scale. The Cerro Prieto has completed and is operating its 100-stamp mill, deriving its power from the electric plant at Magdalena, 40 miles distant. The Sonora-Bonanza Mining Company, with a capital of $1,000,000 gold, operating near Imuris, in the Magdalena district, has just placed in operation a 50-ton experimental concentration mill, and, if successful, the company will probably erect at Imuris a smelter and concentrating mill of 500 tons capacity, which tonnage is claimed for the mines. The Anaconda-Sonora Copper Company, with a capital of $3,000,000 gold, operating in the Sahuaripe district, where it has opened up large bodies of 6 to 10 per cent. copper ore running well in silver and gold, and owns 25,000 acres of land covering water rights and fuel, has commenced the erection of a 100-ton smelting plant on the Yaqui river, nine miles from the mines, which it expects to have in operation by the end of the year. The West Coast Mining and Smelting Company has just been organized in Maine with a capital of $2,500,000 gold, to operate along the west coast of Sonora, and in the country opened up by the Southern Pacific now building between Guaymas and Guadalajara, both in Sonora and Sinaloa. Michigan capital has bought El Archipelago, and Kansas City capital has bought the Antigua, copper and gold properties, both in the Moctezuma district. The Alacran in the Arizpe district has begun shipping, and the Sierra del Oro Mining Company, in the same district, is building a wagon road to the Izabel station on the Nacozari Railroad, when it will begin shipping to Douglas instead of to Cananea.

TEPIC.

Plomosa and Houston—Chicago people are negotiating for this mine, at Amatlan de Cañas, and if they purchase will probably put in a 15- or 20-stamp mill.

Negociacion Minerara de Huicicila—Several months ago the property of this company, in the Compostela district, consisting of 96 pertinencias (230 acres) and a small stamp and lixiviation plant, which had been closed down about a year, was auctioned at $3000 by order of the Civil Court, in the City of Tepic, to satisfy the creditors represented by José M. Macias.

SOUTH AMERICA.

PERU.

Ica Copper District—Mining proper commenced only in 1873. From 1876 to April, 1905, inclusive, it is estimated that fine copper to the amount of 6586 tons was produced from ore averaging 25 per cent. of metal.

From 1899 to 1902, owing to the rise in that metal, several of the mines were re-opened, but no actual development work was attempted.

Ica Province is composed of a wide band of sedimentary rocks of Tertiary and Quarternary age, parallel with the western Andes and the coast line. Running parallel with the sedimentary band, and to the east of it, is a narrow band of labradorite diorites and quartz diorites, containing here and there patches of limestone and sandstone. The copper deposits hitherto exposed are confined almost entirely to the northwestern portion of the igneous band in the neighborhood of Ica.

The zone of fractures with copper-bearing veins follows a band parallel to the principal fracture of the region, by which labradorites, basalts, and perhaps rhyolites have been injected.

The filling at the surface is composed of oxidized ores of copper; in some veins oxichloride of copper (atacamite) appears to have been precipitated; in depth appear the transition zones of sulphides, in part enriched by secondary concentration, but revealing that the greater portion of them are primary, and have come from below.

The rock in which the veins occur is a portion of the labradorite diorite mass; a very basic rock, like the basalt and labradorite intrusions running parallel to the copper ore region.

In no important mine has the sulphide zone of secondary concentration been worked, much less that of the primary sulphide zone; for in no mine has the subterranean water level been reached, except in the Adelaide mines of Cansa, where rich black sulphides appeared when this water was struck, the workings being abandoned on account of the latter.

The strike of the veins cannot be verified for any great length, the dip is almost vertical, and the thickness is great only in the columns of principal mineralization. The distribution of the zones of mineralization takes the form of columns, and the bunches, *bolsonadas*, of rich ore in these columns are separated by sterile or very poor zones.

The primitive sulphide species are: marcasite, pyrite, pyrrhotite, chalcopyrite, and mispickel; and the secondary include covellite, chalcocite, erubescite, and chalcopyrite.

At and near the surface is a very poor zone, consisting of gangue which has resisted dissolution, full of cavities, giving the outcrop a scoriaceous and spongy appearance. Below this is the zone of oxides, more or less rich, with insoluble chlorides, carbonates, etc., also containing cavities from which the primary species have disappeared. Still further down is the transition zone, in which one meets with sulphides of the primary and secondary formations. Then succeeds the zone of rich secondary sulphides, in which the cavities left by the primary filling have been refilled by secondary ores more or less rich in copper or other metal. This zone passes by insensible degrees into the zone of primary sulphides.

The amount of disposable copper ore is estimated at 54,839 short tons, containing on an average 10 per cent. of copper.

Among the inconveniences of mining and smelting in this region may be mentioned: Lack of water as a motive power; at Los Molinos it is from 4 to 9 leagues distant, and at Yauca and Tingue the distance far exceeds this. Want of surface water for milling purposes and for domestic use. Scarcity of miners in the department. The hot climate. Want of fuel for industrial purposes; nevertheless coal may be discovered in the near future in Paracas. The high freights, and want of a special tariff for ores on the railroad from Ica to Pisco.

Coal Trade Review.

NEW YORK, Sept. 13.

The coal trade has not yet awakened to a sense of its insecurity. Although traffic is greatly hampered by the diversion of cars and motive power to the Western grain trade, so that coal shipments are far below normal, still the amount of coal leaving the mines is ample to supply the small current demand. Car shortage is certain to become more formidable as the season advances, so that coal consumers, who must shortly put in their winter's supply, are undoubtedly laying up trouble for themselves by their procrastination. Anthracite users particularly are singularly unobservant of the situation.

COAL TRAFFIC NOTES.

The coal and coke traffic originating on all the lines of the Pennsylvania Railroad for the year to September 1 was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite.....	3,107,606	2,877,223	D. 230,383
Bituminous.....	19,088,698	20,984,834	I. 1,896,136
Coke.....	7,303,859	8,375,392	I. 1,071,533
Total.....	29,500,163	32,237,449	I. 2,737,286

The gain this year was 9.3 per cent.

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the week ending Sept. 8 were 12,558 short tons; for the year to same date they were 519,378 tons.

Shipments of coal and coke over the Chesapeake & Ohio during July were, in short tons:

	Coal.	Coke.	Total.
New River.....	375,113	13,019	388,132
Kanawha.....	278,213	5,508	283,721
Kentucky.....	7,314	.....	7,314
Connecting lines...	39,177	5,935	45,112
Total, 1906.....	699,817	24,462	724,279
Total, 1905.....	654,988	28,176	683,164

The increase this year was 41,115 tons, or 6 per cent.

New York. Sept. 12.

ANTHRACITE.

While there is nothing new to report in the situation in the hard-coal market, there seems to be a strong feeling of better times in the near future. Consumers have, in the past, laid by a considerable surplus of hard coal, and now their stocks have materially decreased and they will be forced, in a short time, to enter the market and lay in their supplies for the winter. The continuation of mild weather and the fact that many people are still away from the city, tends to put off the time of purchase for a few weeks longer. When purchasing begins it is believed that the market will become extremely active and that prosperity will be apparent in the trade.

Prices are $4.75 for broken and $5 for egg, stove and chestnut. In the steam sizes we quote $2.80@3 for pea; $2.25 @2.50 for buckwheat; $1.45@1.50 for rice; $1.30@1.35 for barley; f.o.b. New York harbor shipping points.

BITUMINOUS.

The expectation that the Atlantic seaboard trade in September would improve has not been fulfilled, and it does not look as if much improvement can be expected during the month. Trade in the far East is quiet, though there seem to be enough orders to keep the mines moving in a quiet way. Trade along the Sound is very dull. New York harbor trade is quiet and prices are not as good as they have been this summer; $2.40@2.50 has been quoted on fair grades of steam coal and $2.30 for West Virginia coal.

Transportation from mines to tide is a little slower than usual, but nobody is complaining, because demands are still well taken care of. Car supply is somewhat short on all roads, but in this respect the Baltimore & Ohio seems to be the worst offender. In the coastwise vessel market, vessels are in fair supply and rates are strong at the following quotations: Philadelphia to Boston, Salem and Portland, 65@70c.; to Lynn, 80c.; to Providence, New Bedford and the Sound, 55c.; to Newburyport, 85c.; Portsmouth and Bath, 70@75c.; Bangor, 80 @85c.; Saco, 90c. and towage; Gardiner, 85@90c. and towage.

Birmingham. Sept. 10.

All the coal mined in Alabama is finding a ready demand. Plans are under way for an increase in the output, and before the end of the month two mines not now in operation will be producing a good quantity of coal. The Sloss-Sheffield Steel and Iron Company is preparing to start up its Cardiff mines, and employment will be given to all miners who apply. It is believed that during the last three months of the year the production will be 1500 to 3000 tons a day more than it is now.

There has been no change in prices, except for steam coal, in the past month. Some orders are being placed for delivery through most of the winter. Coke is more plentiful, but prices hold firm. There is but little complaint as to the supply of coke throughout the district.

Chicago. Sept. 10.

The coal market is improving, though slightly. Sales of Western and Eastern bituminous are by no means heavy, but prices generally are firmer and there is a feeling of confidence by dealers, large and small, that September will bring lasting relief from the long depression of the summer. Car shortage is apparent and troubles Eastern as well as Western mine products. In the local market, fine coals are stronger and there is a growing demand for prepared sizes. There is more improvement, in general, in business outside than within the city.

Illinois and Indiana coals bring $2@2.25 for prepared sizes, $1.70@1.90 for run-of-mine and $1@1.50 for screenings. Hocking smokeless and Youghiogheny hold up firmly to circular prices, with deliveries slow and uncertain, though requirements are not heavy by consumers. There is apprehension by the trade of the results of the increase in buying that normally comes by October. With Eastern coals relatively so difficult to obtain now, the result is likely to be large diversion of trade to Western mines.

Anthracite continues weak, with no indications of brisk business before the coming of cool weather and the prospect of much difficulty then in handling shipments.

Cleveland. Sept. 11.

The coal market is strong all through this territory, being influenced in the main by the car situation, brought about by the heavy lake movement. Shipments of the mines to the lakes are so heavy that the major portion of the car supply is being diverted into that trade. The price now ruling on mine run of steam coal is between $1 and $1.10 at the mines for both Ohio and the Pennsylvania product. At the same time the movement up the lakes is increasing rapidly. Boats are in good demand and have been so for the past two or three weeks. Many shippers pay higher rates for moving their product. Wild rates generally have held steady at 50c. to Lake Michigan and 40c. to the head of the lakes. On some cargoes as high as 55c. has been paid to Lake Michigan.

The coke market is the strongest part of the trade just now. The best grades of 72-hour foundry coke are selling at $3.75 to $4, the former being the absolute minimum. The best grades of furnace coke are selling at $3 at the oven. The ovens adhere to their positions, recently taken, not to contract for any coke at present prices for delivery past the first of the year.

Pittsburg. Sept. 11.

Coal—There is no relief from the car shortage, as the leading producers are still getting only 40 per cent. of their daily requirements. Producers are very anxious to increase their outputs, but have exhausted their efforts to get more cars. Prices remain firm at $1.10@1.15 for mine-run coal on large contracts.

Connellsville Coke—Demand continues good, with some consumers figuring on contracts for both furnace and foundry coke for next year. The coke operators expect a hard winter and are very firm on prices for first-quarter and first-half coke. Strictly Connellsville furnace coke remains at $2.75 for next year, while $2.85 is obtainable for prompt shipment. For prompt 72-hour Connellsville foundry coke prices are higher at $3.15@3.25. The production of the week was 278,807 tons, a gain of a few hundred tons, while shipments fell off 1783 cars, to 12,078 cars, distributed as follows: To Pittsburg and river points, 4303 cars; to points west of Pittsburg, 6379 cars; to points east of Connellsville, 1396 cars. The production of the lower Connellsville region for the week is estimated at 105,476 tons, making a total for the whole district of 384,283 tons.

Foreign Coal Trade.

Messrs. Hull, Blyth & Company, Cardiff, report that the Welsh coal market shows but little fresh inquiry. Best Welsh steam coal sells at $3.96; best Monmouthshire, $3.54; best small steam coal, $2.52 f.o.b. shipping port, exclusive of wharfage, but including export tax. Freights are unchanged at: $1.25@1.45 to Mediterranean ports; $2.64 to Ceylon and Singapore; $3.36@3.84 to Rio de Janeiro and Buenos Ayres.

Coal Imports of Japan—In 1905 Japan imported 295,953 long tons of coal, almost exclusively from Great Britain. It was used mainly for naval supply. Cardiff is the favorite quality, but some demand has now arisen for coking coal. The present duty on imported coal is equivalent to 50c. per ton, but after Oct. 1, of this year, coal will be admitted free of duty. The

coke imported was valued at $364,140, or over three times as much as in 1904. The import duty on coke is now 75c. per ton, but will be raised, on Oct. 1, to $1.08 per ton.

During 1905 the total output from the collieries in India and Burma amounted to 8,430,000 tons against 8,220,000 tons in 1904. Bengal is the largest contributor, having yielded 7,242,758 tons in 1905. Nizam's dominion gave 454,294, and Assam, 277,065 tons. The exports of Indian coal to Indian ports, principally from Calcutta to Bombay, Karachi and Madras, rose from 1,450,000 tons to 1,640,000 tons, and those to ports outside India, as well as to ports in Burma, principally from Calcutta to Rangoon and Ceylon, from 896,880 tons to 1,144,680 tons. The imports of coal from the United Kingdom decreased from 174,700 tons to 147,730 tons. The consumption of Indian coal by Indian railways increased during the year from 2,450,000 tons to 2,670,000 tons.

Iron Trade Review.

NEW YORK, Sept. 12.

As the season advances, it becomes more difficult to obtain supplies of iron on short notice. Already, the heaviest sales are for delivery up to July, 1907, and only small dealers and consumers who must have iron at any price are in the market for immediate delivery. Additional furnaces are being installed as fast as possible, but whatever relief they bring can be of only short duration. Bridge plates and structural steel seem to be the finished materials most in demand.

Birmingham. Sept. 10.

Fancy prices prevail for pig iron in Alabama. The statement is made that $17 per ton, No. 2 foundry iron, has been paid for a small lot, immediate delivery. There is a good demand for iron, and one of the larger companies announces orders for 90,000 tons to be delivered during 1907. No. 2 foundry iron, delivery toward the latter part of the year, commands $16 per ton. Iron selling now for delivery during the first quarter of 1907 brings between $15 and $15.50 per ton.

No. 3 furnace at Bessemer, belonging to the Tennessee Coal, Iron and Railroad Company, blows in this week. The furnace of the Lacey-Buek Iron Company will be started up shortly. Every effort is being made in this section to fill all orders on the books, and every energy is being bent to improve the production in this district. There is need for every ton of iron that can be manufactured. There is a better supply of ore.

As noted in another column, the reorganization of the Southern Steel Company has occurred. Moses Taylor, of Kean, Van Courtlandt & Co., New York, is president of the company; C. P. Perin, New York, chairman of the board; E. T. Schuler and E. C. Buek, vice-presidents; George H. Schuler, treasurer. E. T. Schuler is in charge of the steel-manufacturing departments, and E. C. Buek is in charge of the mining and iron-making works. Offices will be maintained in New York and in Gadsden, Ala.

Chicago. Sept. 10.

The iron market continues quiet, but firm. Sales are being made steadily for the first and second quarters of 1907, with a considerable business in lots for immediate delivery, due chiefly to the delay in shipments of Southern iron and in part to the heavy requirements of the melters. The demand for quick-delivery lots continues large and the supply small, causing premiums that induce the furnacemen to bring into market all the odd lots that can be found. There is complaint about the lack of cars, that promises to grow with the heavy deliveries of autumn. Everything points to a continuation of fair sales and the gradual extension of sales into the third quarter of next year, though business is now in the first and second quarters.

Prices in general are higher, though there is much variation. On general contracts, Northern No. 2 is in the neighborhood of $20 and Southern No. 2 about $15.50 Birmingham ($19.15 Chicago). Special deliveries and requirements frequently run these prices up 25@75c. The tendency of prices is upward.

Coke continues strong, with the best Connellsville $5.65@6 per ton.

Cleveland. Sept. 11.

Iron Ore—Although no sales of ore have been reported it is understood that consumers of high-grade bessemer have been assured of their supply during the next year, being given an option, virtually without quoting any price. The movement down the lakes so far has been heavy enough to indicate a season's movement of at least 35,500,000 tons. This is based on a movement for August of 5,665,815 tons, a gain of 656,433 tons over August of last year. The movement to Sept. 1 was 22,721,025 tons, showing a gain over the corresponding period a year ago of 1,672,969 tons.

Pig Iron—Buying of pig iron has been quiet during the past week. Some buyers are of the opinion that prices are too high and are waiting for the reaction. Prices, however, do not seem to be checked in their advance. No. 2 is being sold at $20 to $21, with about $20.25 the ruling price. Sales for first-half delivery are made at $18.50, the minimum, to $19.25, the maximum. Southern furnaces are quoting $15.50 Birmingham for No. 2. Basic is being sold in small quantities at $18.25 for first-half delivery, but it would be impossible to get much iron for less than $18.50 in the Valley. The same is true of bessemer.

Finished Material—Demand for bar iron is good, but prices have advanced faster than the demand warrants. This is due to curtailed production on account of a shortage of labor and also to the difficulty in getting scrap. The market rules at 1.70c. Pittsburg. Sheets are strong, blue annealed advancing $1. Plates and shapes are easier, due to increased production. Forging billets are scarce and are moving up.

New York. Sept. 12.

Pig Iron—The market is strong and buying continues heavy, particularly for next year. A certain order for 3600 tons of Northern iron has been taken at $19, furnace, for first-half delivery. Iron for delivery this year commands $1@2 premium.

A noteworthy demand has arisen for high silicon iron, required for softening low-grade foundry iron and scrap. Iron with over 3 per cent. silicon is almost out of the market, having been sold out long ahead. Steel-making iron continues strong, but quiet, owing to its scarcity.

Current quotations for pig iron are for New York or parallel delivery:

Northern:	
No. 1 X foundry	$20.25@$20.75
No. 2 X foundry	19.25@20.25
No. 2 plain	18.75@19.75
Forge pig	17@18
Southern:	
No. 1 foundry	19.50@20.50
No. 2 foundry	19@20
No. 3 foundry	18.50@19.50
No. 4 foundry	18@18.50
No. 1 soft	19.50@20.50
No. 2 soft	19@20
Gray forge	17@17.50
Basic pig:	
Northern	18.75@19.25
Virginia	18.60@19.10
Alabama	

City or local deliveries are not included in prices, which are for large lots, on dock or cars.

Bars—In good demand at full prices. Small trade is charged 2½c. store.

Old Material—Active market with prices advancing. No. 1 railroad wrought brings $21@21.50; No. 1 yard wrought, $20@20.50; machinery cast, $16@16.50; while $17.25@17.50 is charged for heavy melting scrap steel. Prices are on cars, Jersey City, or other terminals.

Philadelphia. Sept. 12.

Pig Iron—A good deal of business has been done within the past three days by urgent buyers for early delivery at premium rates. The tone of the market, therefore, is very strong. Basic iron is at present quiet, but there have been large sales for forward delivery. Forge iron has gathered considerable strength. Inquiry is on the increase for second-quarter pig iron. Quotations are uncertain because of the premiums offered by consumers who must have iron at any price. Pig iron has sold within the past few days at $21@21.50 for No. 1 foundry; $20 for No. 2; $19.50 for No. 2 plain; $18 for standard gray forge; $18.50 for basic; and $19.50 for malleable.

Steel Billets—A large business has been

done in steel billets with the usual difficulty as to deliveries. Forging billets are also active. The outside price today for ordinary billets is $30, and forging billets run from $33 to $35.

Bar Iron—This trade is active, particularly in small orders. Quotations are 1.73½@1.78½ for both iron and steel.

Sheet Iron—Orders are coming along, most of them for larger quantities than were booked during August. A few of the larger consumers of sheet are placing orders for winter consumption.

Pipes and Tubes—A large amount of business is being done for both locomotive and merchant tubes. Quotations are unchanged and the mills are able to make more prompt shipments than earlier in the season.

Plate—Orders for sheared plate in moderate quantities are now coming along with greater frequency. Universal plates are very active and quotations are without change. Boiler plate is selling quickly in small lots.

Structural Material—Some large contracts for structural material will be awarded this week. Structural mills are taxed to their utmost capacity, and more or less business is being accepted for delivery after Jan. 1.

Steel Rails—Fewer orders for steel rails have been placed this week than for some time. The inquiries for light sections ranging from 16 to 30 lb. are encouraging. There is also quite an amount of business for mine rails of very light sections, but the total volume is insignificant in comparison with the volume of business above 56-lb. sections.

Old Rails—Old rails are hard to get. Quotations range $21.50@22 for iron.

Scrap—The scrap dealers are holding desirable material at figures which buyers are not willing to pay, excepting in small lots to cover urgent necessities.

Pittsburg. Sept. 11.

New business in finished steel products has been very light, while specifications are almost as heavy as they were, and are still beyond the current output of the mills, so that in many lines it is necessary for the mills to pro-rate shipments, giving each customer only a certain percentage of the material asked for. This is true particularly in plates and steel bars.

It is reported that the Pennsylvania Railroad Company is considering the placing of orders for 14,000 cars. No inquiries have reached the car builders yet, but it is believed the orders will be placed soon and this will probably start a general buying movement. The Harriman lines recently contracted for a large number of cars, and within the fortnight the steel corporation has taken a total of fully 3000 all-steel cars, for its two Minnesota ore roads and for the Union Railroad, its terminal road at the Carnegie mills.

With better weather, furnaces and mills are getting better outputs, which will be still heavier next month, as October and March are the best months of the year for large outputs. By the early part of November the congestion in specifications will probably be worked off, and trade will assume a more normal aspect, provided the car shortage which is already causing some discomfort has not reached extreme proportions.

Pig Iron—Steel-making pig continues very strong. The only large seller continues to be the Snyder interest, which holds bessemer at $18.575, Valley, and basic at $18.50, Valley, for any delivery. No heavy sales of bessemer have been made, but 5000 tons of basic have been sold in three or four lots, for first-half delivery, at the regular price of $18.50, Valley. A sale of a small lot of bessemer was made by a middleman for fourth-quarter delivery at a fancy price, $19.35, Valley. Demand for prompt foundry iron is active, although hardly as heavy as a week ago. For future delivery foundry iron remains at $18.60@19.10, Pittsburg, and gray forge at $17.85@18.10, Pittsburg.

Steel—Only occasional lots of steel can be picked up, at $28@29 for bessemer and $29@30 for open-hearth billets. Sheet bars are in the neighborhood of $30, Pittsburg. Deliveries on both billet and sheet-bar contracts are far behind, but have been slightly better the past week and mills are doing something toward catching up. Plates are firm at 1.60c., Pittsburg, occasional premiums being obtained by Eastern mills. It is about settled that no advance will be made in steel bars, which remain at 1.50c., the large mills being adverse to any advances at this time.

Sheets—There is a moderate amount of new business being booked, while specifications on old contracts are heavy. There are reports of premiums paid in some instances, but these refer only to very special cases. The market remains at 2.50c. for black sheets and 3.55c. for galvanized, 28 gage.

Ferro-manganese—The market is a trifle easier this week, prompt ferro being obtainable at $85 and future deliveries at $80, delivered.

Chemicals.

Nitrate of Soda—Messrs. Mortimer & Wisner report statistics of Chile saltpeter for the Atlantic States, as on Sept. 1 as follows, in short tons:

	1905.	1906.	Changes.
Imported from S. A. 8 mos.	177,500	181,780	I. 4,280
Visible supply to Dec. 15.	81,700	92,600	I. 10.900
Stock on hand, Jan. 1....	8,380	13,100	I. 4 720
Deliveries, 8 mos.....	177,980	192,280	I. 14,300

Current quotations on 96 per cent. are $2.45 per 100 lb.; 95 per cent. can be had for 2½ to 5c. per 100 lb. cheaper.

Metal Market.

New York, Sept. 10.

Gold and Silver Exports and Imports.

At all United States Ports in July and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
July 1906..	$1,303,248	$9,838,296	Imp. $8,535,048
" 1905 .	1,159,274	4 973.241	" 3,813,967
Year 1906..	32,913,962	72,376,074	" 39,462,112
" 1905..	40,990,864	21,582,694	Exp. 19,408,170
Silver:			
July 1906 ..	4,360,628	3,270,927	" 1,089,701
" 1905 ..	4,285,000	2,976,296	" 1,308,704
Year 1906 ..	37,797,855	26,947,855	" 10,840,100
" 1905 ..	29 366,266	18,149,719	" 11,216,547

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.

For week ending Sept. 8 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$ 3,070	$ 373,543	$ 773,214	$ 40,571
1906.....	5,952,743	49,599,427	40,402,911	1,492,662
1905.....	38,280,843	1,301,324	22,860,993	2,505,491
1904.....	71,907,714	3.705,596	26,916.457	635,963

All the gold exported this week went to Central America, and the silver to London. Most of the gold imported this week was United States coin from Cuba, and the silver came from Mexico, Central America and the West Indies.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Sept. 8 gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts..	$1,106,683,500	$1,051,774,100
Deposits.....	1,125,422,600	1,014,214,100
Circulation.....	52,702,400	44,917,800
Specie.....	207,472,400	169,341,600
Legal tenders.....	78,714,600	77,634,000
Total reserve.....	$286,187,000	$246,975,600
Legal requirements....	281,355,650	253,553,525
Surplus reserve.....	$4,831,350	.....
Deficit.....	.....	$6,577,925

The failure of the banks to maintain their legal reserve last week is a corollary of the pressing demand for cash, particularly in the West. The offer by the Secretary of the Treasury to make good, by advance of Government funds, the loss of interest on gold in transit will relieve the money stringency, and will hasten, though not generally increase, imports of gold from London.

The following table shows the specie holding, in dollars, of the leading banks of the world:

	Gold.	Silver.	Total.
New York.....	.....	.....	$169,341,600
England.....	$178,469,115	.....	178,469,115
France.....	594,888,395	$221,460,635	816,349,030
Germany.....	174,690,000	58,230,000	232,920,000
Spain.....	74,615,000	113,195,000	187,810,000
Netherlands....	32,989,000	30,756,500	63,745,500
Belgium.....	16,050,000	8,025,000	24,075,000
Italy.....	122,755,000	16,343,500	139,098,500
Russia.....	566,835,000	27,740,000	594,575,000
Austria.....	231,955,000	63,095,000	295.050.000
Sweden.....	18,920,000	.....	18,920,000

The returns of the associated banks of New York are of date Sept. 8 and the others Sept. 7. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The

New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell, as follows, for the year to Aug. 30.

	1905.	1906.	Changes.
India.....	£ 4,243,871	£ 11,759,543	I. £ 7,516,172
China.....	753,841	280,700	D. 473,141
Straits..	2,800	1,750	D. 1,050
Total.....	£ 5,000,012	£ 12,041,993	I. £ 7,041,981

Receipts for the week this year were £232,000 from New York and £9000 from the West Indies, total £241,000. Exports were £126,000 to India, £2000 to Egypt, and £43,000 to Ceylon; of the latter, all but £2000 was in Mexican dollars. The total export was £271,000 for the week.

Indian exchange holds firm. Council bills are taken at 16 1/16 d. per rupee. Exports of silver to India continue heavy.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars.....	$0.53	$0.55
Peruvian soles and Chilean.....	0.48	0.51½
Victoria sovereigns.....	4.85½	4.87½
Twenty francs.	3.86	3.89
Spanish 25 pesetas...	4.78	4.80

SILVER AND STERLING EXCHANGE.

Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
6	4.83⅛	67⅝	31½	10	4.83⅛	68⅛	31 11/16
7	4.83⅛	67⅝	31 7/16	11	4.83⅛	68¼	31⅝
8	4.83⅛	68⅛	31⅝	12	4.83⅛	68¼	31⅝

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals.

Daily Prices of Metals in New York.

Sept.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
6	18¾ @19	18 3/16 @18¾	86 3/16	40⅜	5.75	6.05	5.90
7	18¾ @19	18 3/16 @18¾	86⅜	40⅜	5.75	6.05 @6.10	5.90 @5.95
8	18¾ @19	18⅝ @18⅞	.....	40⅜	5.75	6.10	5.95
10	18⅞ @19⅛	18 11/16 @18⅞	86¾	40⅜	5.75	6.10 @6.15	5.95 @6.00
11	18⅞ @19⅛	18 11/16 @18 13/16	86 11/16	40½	5.75	6.15 @6.20	6.00 @6.05
12	18⅞ @19⅛	18¾ @19	86½	40⅜	5.75	6.15 @6.20	6.00 @6.05

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—The very heavy inquiry of the past few weeks has to a great extent absorbed the available supply for the current year. Consumers are already considering purchases for the first quarter of next year, and it has been reported that some further business has been consummated for that delivery. The foreign demand continues on a satisfactory scale, and all in all conditions are such that producers feel confident in the maintenance of the present level of prices for an indefinite time to come. The market closes firmly at 18⅞ @19⅛c. for Lake copper; and 18¾@19c. for electrolytic in ingots, cakes and wirebars. Casting copper opened the week at about 18½c., and closed at about 18¾c., the average at which business was done during the week having been 18½@18⅝c.

The standard market in London has maintained the advance recorded previously and closes steady at £86 12s. 6d. for spot, and £86 10s. for three months. Refined and manufactured sorts we quote as follows: English tough, £89 10s.@£90 10s.; best selected, £90 10s.@£91 10s.; strong sheets, £96@£97.

Tin—The market has been steady. Transactions both on this side and in Europe appear to be of a retail character, but as the stocks are small, the market is holding its own. The quotations at the close are 40¼@40½c.

The London market has not developed any new feature excepting that there has been a slight easing off in the three months position. The close is £185 for spot, £183 10s. for three months.

Lead—A steady inquiry is reported and business is being done at last quotations.

The London market is displaying a great deal of strength. Supplies are lower than have been known to be for some years and prices have advanced from day to day. The close is cabled at £18 3s. 9d. for Spanish lead, £18 5s. for English lead.

St. Louis Lead Market—The John Wahl Commission Company telegraphs from St. Louis, Sept. 11, that lead is strong in that market, Missouri brands selling at 5.77½@6c., according to brand and delivery.

Spelter—At last this metal is beginning to sympathize with the rest of the list and under a heavy inquiry on the part of both speculators and consumers, prices have advanced daily. The close is strong and advancing at 6@6.05c. St. Louis, 6.15@6.20c. New York.

The London market has remained steady at £27 10s. for good ordinaries, £27 15s. for specials.

The Lanyon-Starr Smelting Company, which is to erect a zinc smelter at Bartlesville, Oklahoma, will have $250,000 preferred stock and $500,000 common stock. E. V. Lanyon is president of the company; Jesse G. Starr, vice-president; and Dee Lanyon, secretary and treasurer. The plant will be laid out for four blocks of furnaces.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been small, the highest price having been $8 on Jan. 6, the lowest $7.65 on May 18.

Antimony—More activity is reported, and prices have advanced somewhat, quotations being 21@22½c. for ordinary brands, while specials remain unchanged at 24@25c.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 45@50c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Platinum—No further advance is reported since last week, when the price rose sharply to $33 per oz. unmanufactured and $24 for scrap metal. It is impossible to predict future prices, but dealers look for little or no recession from present quotations for some time to come.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about $43 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is lowest at £7 per flask, while jobbers are asking £16 18s. 9d.

Aluminum—The chief producer gives list prices for ton lots and over, as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. over ingots. Rolled sheets are 45c. per lb. up, according to size.

Missouri Ore Market.

JOPLIN, Sept. 8.

The highest price paid for zinc was $48 per ton, the assay basis price ranging from $45 to $42 per ton of 60 per cent. zinc. Average price, all grades, was $43.84.

The highest price known to have been paid for lead was $83, though $84 is claimed to have been received by one producer. Medium grades sold at $77 to $81 and the choicest ore at $81 to $83. Average price, all grades, was $79.62.

With an increase of 18,312 tons in the zinc shipment for this year, the prediction in the last New Year's number of the JOURNAL bids fair to be more than realized. The balance of the year need

produce an excess of but 8000 tons to meet the forecast, while the heaviest outputting period of the year is at hand. September, October and November usually exceed any other three months of the year, and from present conditions it must be judged that this year the prospects are very favorable for these months to exceed any former year. The extraordinary high prices for lead, and excellent prices for zinc have so stimulated the output that many new mills have been commissioned. Every mine in the district can be operated and the new developments at Alba, Neck City and Badger have more than offset the decrease of some old mines.

Following are the shipments of zinc and lead for the week ending to day:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	2,406,230	662,470	$ 79,638
Joplin	2,457,230	252,160	66,606
Galena-Empire	1,420,820	184,420	37,924
Badger	797,420	.....	18,739
Neck City	789,420	.....	18,451
Alba	744,890	.....	17,504
Duenweg	699,720	83,750	16,548
Aurora	831,440	.....	15,375
Prosperity	60,130	277,480	12,449
Granby	509,000	20,000	9,700
Oronogo	183,150	7,900	6,512
Spurgeon	236,930	28,040	5,125
Sherwood	119,300	15,260	3,354
Carthage	67,120	.....	1,577
Stott City	64,010	.....	1,344
Mansfield	29,480	.....	589
Totals	11,416,290	1,531,430	$311,430
36 weeks	380,894,790	53,030,500	$10,298,159

Zinc value, the week, $250,331; 36 weeks, $8,274,889.
Lead value, the week, 61,099; 36 weeks, 2,023,270.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58.00	76.13
May	43.31	40.51	May	58 27	78.40
June	40.75	43.83	June	57.80	80.96
July	43.00	43.25	July	58.00	74.31
August	48.83	43.56	August	58.00	75.36
September	46.75	....	September	63.50	....
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Wisconsin Ore Market.

PLATTEVILLE, Sept. 8.

The demand for ore continues most satisfactory. Another rise in prices is reported; 60 per cent. ore sold at $45@45.50. The Dall sold 2 carloads at $47.50 per ton. The increased output of the last two weeks will probably receive a check, now that the local fairs are on. The Empire was compelled to shut down Tuesday owing to a shortage of labor. There is a strong talk of importing labor from other fields.

The increased demand for zinc ore has given an impetus to those who are developing properties. It seems as if the buyers were not able to get enough to fill their wants. Much depends upon how long and for how much the Mineral Point Zinc Company is in the market, for the De Pue works.

The price of lead stiffened up a bit, while sulphur and drybone remained about the same as last week.

The following camps of the Platteville district loaded ore for the week ending Sept. 8 as follows:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Highland	411,350	.....	.....
Cuba City	335,000	74,000	.....
Linden	157,500	.....	.....
Benton	267,800	.....	.....
Mineral Point	133,800	.....	106,640
Buncombe & Hazel Green	115,300	.....	.....
Total for week	1,420,750	74,000	106,640
Year to Sept. 8	49,376,126	2,456,550	2,840,110

Mines at Platteville were closed down, and thus shipped no ore.

Mining Stocks.

NEW YORK, Sept. 12.

High rates of interest on call money with a great scarcity of gold characterized the early part of the week. However, this state of affairs lasted only a short time, and, on persistent rumors of gold shipments, interest rates dropped to normal and on persistent rumors of gold ship-

Amalgamated Copper was the feature on the New York exchange and reached $113⅜, the high point of the present movement, at which figure considerable profit taking was indulged in, which caused a steady break until $110⅝ was reached, at which price the stock closed. Seven hundred and fifty thousand shares were dealt in during the week and the net loss for that period was $1 per share.

Anaconda was dealt in to only a limited extent, but closed $3 lower than last week. American Smelting common continued to sell off, closing at $152¼, a net loss of $2 on sales of 179,900. Steel common reached 47¾ on fairly good dealings. The sales amounted to 678,000 shares and the stocks closed, ex-dividend, at $45½.

Colorado Fuel was active all week, opening at 55½, reaching a high mark for the week at 59⅛, and closing at 56⅝ on sales of 92,000 shares.

In the curb market the tone was generally weak. Among the mining shares British Columbia, Cumberland, Ely, Micmac and Union were the most active among the copper shares. The general trend of the market was dull, however, and prices held quite firmly with the exception of Montgomery-Shoshone and Mitchell, which lost about 1 point each, closing at $13 and $4¾ respectively. Nipissing continued its activity all week but the price seems to have sought a slightly lower level, 80,000 shares being dealt in between $9⅜ and $8⅝. The stock closed at $9.

Greene Gold and Silver was dealt in only to a limited extent and was very quiet, closing at $2.

The closing prices of other mining stocks were: Butte Coalition, $33⅛; Mines Company of America, $1.22; Guanajuato, $5¼; Nevada Utah M. & S., $4; Utah Apex, $7½; Tennessee Copper, $42¾, a loss of $2 during the week.

Boston. Sept. 11.

Dullness has characterized the local mining market the last week, although as a rule prices are higher. Utah Consolidated rose over $2 to $62.62½. An increase in the dividend amount is anticipated in December. Earnings are at the rate of $8 per year, while the company is paying $5. Lawson's Trinity spurted $2.25 to $11 on heavy trading. U. S. Smelting rose $4 to $62. Franklin spurted $2 to $21.75, with fractional setback. Old Dominion is almost $1 higher at $42.37½. Calumet & Arizona is up $1 to $117.50 ex-dividend. A further increase in the dividend distribution is expected, as the company is said to be earning close to $24 per year. The St. Mary's Mineral Land Company has declared its fourth $1 dividend this year, which compares with $2 paid last year. Osceola is up $3 to $117 and is continually being absorbed. Calumet & Hecla holds strong around $735 per share with very little stock offering. Amalgamated touched $113 in this market, closing tonight at $110.75, against $109.50 a week ago. On the curb Utah Apex is up $1 to $7.50. Raven advanced to 89c. but did not hold it.

Colorado Springs. Sept. 7.

The mining market has been fairly active during the past week, with Portland as the leading feature. This stock has declined 25c., and sold on today's market as low as 1.12, closing at 1.14. The decline is attributed to the throwing on the market of a large block of stock by former president J. F. Burns. The management claims that the mine is in the same condition as for some time past.

Mexico. Sept. 3.

The mining market during the past week remained in the same stagnant condition that has characterized it for some months, the only awakening being Friday and Saturday on the Oro Nolan of El Oro, which, because of a recent strike, jumped in the two days from $430 to $1000 a share, closing Saturday at $875. Of the other shares, on which there were barely sales enough to give a market price, there were the following: In the State of Guanajuato, Providencia San Juan de la Luz, $1875 to $1950, and Rama, $26; in San Luis Potosi, Santa Maria de la Luz, $262, and Barreno, $200; in Nuevo Leon, Norias de Bajan, $1080 to $1175 on the rumor that an effort was being made to get control, and Fraternal at $400; in Pachuca, State of Hidalgo, Blanca y Anexas at $600, Soledad, at $1525, and Santa Gertrudis at $90; and in El Oro, Aldebaran at $98, Guadalupe de los Reyes at $60, Mexico mines at $26, and Dos Estrellas, $8500 bid, but no sales.

STOCK QUOTATIONS.

NEW YORK. Week Sept. 11

Name of Company.	High	Low	Clg.	Sales.
Amalgamated*	113⅜	108⅜	110⅝	753 600
Anaconda*	282¾	274½	277½	126.950
British Col. Copper	11⅛	10⅜	10⅝	43,610
Butte Coalition*	34½	33	33½	6,210
Cum. Ely Mining	10⅛	9½	9⅞	18,6 0
Greene Gold	2¼	2	2⅛	1,240
Greene Gold & Silver	2⅛	2	2	3,710
Guanajuato	5⅜	5¼	5¼	3,200
Micmac	5⅜	5	5⅛	9,185
Mines Co. of Am	1.22	1.18	1.22	6.000
Mitchell Mining	5½	4½	4¾	8,495
Mont. Sho. Con. (New)	14½	12⅛	13	800
Nev. Utah M. & S.	4¼	4	4	2,645
Nipissing Mines	9⅜	8½	9	80,300
Tennessee Copper	44⅛	41⅜	42¾	2,000
Union Copper	1⅜	1⅛	1⅜	24,700
Utah Apex	7⅛	6¼	7⅛	2 750

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	154⅝	150	152½	179.900
Am. Smelt. & Ref., Pf.	117	116⅜	116⅜	1,600
Bethlehem Steel	23⅛	22½	23	900
Colo. Fuel & Iron	59⅛	53⅜	56⅝	92,100
Federal M. & S., Pf*	95⅛	94⅜	94⅜	300
Inter. Salt*	39⅛	36⅜	39	3 975
National Lead	79	76	77⅜	9,450
National Lead, Pf	101½	101¼	101½	300
Pittsburg Coal	14⅛	14⅛	14⅛	200
Republic I. & S.	37½	29⅝	36⅛	79,585
Republic I. & S., Pf.	103	99⅛	102⅛	14,9 0
Sloss-Sheffield	80	76⅛	78½	6,200
Tenn. C. & I.	159⅝	158½	159⅝	200
U. S. Red. & Ref	37	34	34	2,200
U. S. Red. & Ref., Pf.	75½	74	74¾	1,600
U. S. Steel	47⅜	45⅞	45⅛	678,120
U. S. Steel, Pf.	107¾	106⅛	106½	49.230
Va. Car. Chem	41⅛	38	40⅛	7,200

BOSTON.

Adventure	6⅛	o⅞	o⅞	260
Allouez	36	34	35⅛	2,037
Atlantic	13¼	13⅛	13⅛	135
Bingham	32	30½	30⅛	1,234
Boston Consolidated	29⅝	28⅛	28½	2,283
Calumet & Arizona*	117½	116½	117½	1,080
Calumet & Hecla*	735	730	735	72
Centennial	24⅛	22⅝	23¼	1,445
Copper Range	79	76½	76⅞	5,712
Daly-West	17	16	16	315
Franklin	22¼	19¾	21	8,537
Granby*	12⅜	11⅞	12	495
Greene Consolidated*	25⅜	25	25¼	10,705
Isle Royal	20	19	19⅛	321
Mass	9	8⅛	8¼	810
Michigan	13½	13	13¼	143
Mohawk	61½	60	61	1,576
Mont. Coal & Coke rcts.	3	2¼	2½	923
Nevada	18¼	17⅞	17⅞	370
North Butte	95¼	93	94¼	6,361
Old Dominion	42⅜	40	42½	2,431
Osceola	117	113	116½	3,022
Parrot*	26	25	25⅞	210
Quincy*	91	89	89	235
Rhode Island	4⅞	4¼	4⅞	375
Shannon	9¾	8⅞	9¼	6,106
Tamarack	98	97	98	10
Tecumseh	12¼	11⅛	11½	280
Trinity	11	8⅝	9⅞	20,686
United Copper, com.	64	63⅛	63⅝	1,955
U. S. Oil	10	9¼	9⅞	1,070
U. S. Smg. & Ref.	62	57⅞	61⅞	14,629
U. S. Smg. & Ref., pfd.	46½	45⅞	46½	3,417
Utah Copper	62¾	60	62¼	11,257
Victoria	7	6¾	7	130
Winona	8	7	8	130
Wolverine	160	157	159	261
Wyandotte	1.00	1.00	1.00	200

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Am. Agrl. Chem., 28⅛—25; Comstock, .18—.17; Davis-Daly Est., 10—9¾; Gold Hill, 3⅛—2⅞; Gugg. Exp., 274—270; Rich. Eureka, 8½—8¼; Standard Oil, 605—600. (Boston) Ahmeek, 82—80; Am. Zinc, 12—10½; Arcadian, 3⅞—3¼; Ariz. Com'l, 37½—36; Black Mt., 8⅝—8; Cananea, 15¾—15⅝; East Butte, 9½; Keweenaw 10½—10; Majestic, 1¼—1⅛; Raven, .85—.75; Shawmut, 1.00—.95; Superior Cop., 17—16; Superior & Pitts., 17—16¼; Troy, 1½.

PHILADELPHIA. Sept. 11.

Name of Company.	High	Low	Clg.	Sales.
American Cement	7⅛	7	7⅛	330
Cambria Steel	39⅛	36½	38¼	61,767
General Asphalt	9⅛	9	9⅛	
Penn. Steel, pd.	108½	106	106	282
Philadelphia Co.	50	49⅛	50	263
Tonopah Mining	19	18¼	18½	1.227

PITTSBURG. Sept. 11.

Crucible Steel	14⅛	12½	12⅛	5 310
Crucible Steel, Pf.	83¼	80⅛	80¼	3,901
Harbison-Walker Ref.	13	13	13	10
Ohio Tonopah	.27	.25	.25	10 8 0
Tonopah Ext	5⅛	5¼	5⅛	1,100

COLORADO SPRINGS. Sept. 8.

Name of Company.	High	Low	Clg	Sales
Acacia	14	14	14	1,500
C. C. Con	6⅛	6¼	6¼	....
Doctor Jack Pot	9⅛	8⅛	8⅛	....
Elkton	49	47	49	10 517
El Paso	57	53	53	13,500
Findley	78½	75½	75½	1,500
Gold Dollar	8¼	7⅞	7⅞	10,350
Gold Sovereign	7	7	7	5,000
Isabella	21	20	20	28 700
Jennie Sample	9½	9⅜	9⅜	3,000
Mary McKinney	70	65	65	4,550
Portland	1.37	1.12	1.14	21,700
United Gold Mines	9½	7⅞	9⅜	....
Vindicator	95	94	94	900
Work	16½	15½	16½	16,000

SAN FRANCISCO. Sept. 4.

Name of Company.	High	Low	Clg	Sales
Best & Belcher	.92	.90	.90	300
Caledonia	.31	.29	.29	1,500
Challar	.12	.11	.11	2 000
Con. Cal. & Va	.94	.86	.88	3.950
Crown Point	.09	.06	09	2,300
Gould & Curry	.21	15	18	3,900
Hale & Norcross	1.10	1.00	1.05	2,200
Mexican	.92	.84	.85	2,800
Ophir	3.65	3.50	3.50	1,000
Overman	.11	.10	.11	400
Potosi	12	.12	.12	500
Savage	1.05	1.00	1.00	1,700
Sierra Nevada	.21	.17	.20	4,700
Bullfrog Mining	.50	.47	.49	37.100
Diamondfield	.42	.39	.41	17 500
Goldfield of Nevada	.75	.64	.72	47,500
Jim Butler	1.45	1.40	1.42	10,800
Jumping Jack	.47	.45	.46	60,800
Kendall	.75	.75	.75	700
MacNamara	.77	.74	.75	5,600
Manhattan Dexter	.69	.63	.69	10.500
North Star	.50	.48	.50	6,100
Original Bullfrog	.15	.14	.15	7,600
Tonopah Belmont	5.12	5.00	5.12	450

Tonopah Stocks. Sept. 12

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	18 75	18.37½	18.75
Tonopah Montana	2.90	2.87	2.88
Tonopah Extension	5.37½	5.25	5.37½
Tonopah Midway	2.28	2.25	2.25
Tonopah West End	2.65	2.50	2.65
Goldfield Mining Co.	.61	.58	.59
Jumbo Mining	1.30	1.27	1.28
Red Top	1.55	1.50	1.53
Sandstorm	.69	.66	.68
Montgomery Shoshone Cons	13.25	12.75	13.25

St. Louis. Sept. 8.

Adams, $0.40—$0.25; American Nettie, $0.08—$0.06; Center Creek, $2.50—$2.25; Central Coal and Coke, $64.00—$63.25; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$58.00; Columbia, $4.00—$3.25; Con. Coal, $25.00—$23.50; Doe Run (old stock), $350.00—$300.00; Granite Bimetallic, $0.25—$0.20; St. Joe (old stock), $32.00—$30.00.

LONDON. *(By Cable.*)* Sept. 12.

Dolores, £1 12s. 6d.; Stratton's Independence, £0 4s. 3d.; Camp Bird, £1 6s. 3d.; Esperanza, £2 17s. 6d.; Tomboy, £1 6s. 3d.; El Oro, £1 8s. 9d.; Oroville, 0 19s. 3d.; Somera, £0 7s. 6d.; Utah Apex, £1 10s. 0d.; Ariz. Copper, pref., 3 12s. 9d.; Ariz. Copper, def., £3 10s. 6d.

*Furnished by Hayden, Stone & Co., New York.

New Dividends.

Company.	Payable.	Rate.	Amt.
Am. Smg. & Ref. Co., Com	Oct. 15	$1.75	$875 000
Am. Smg. & Ref. Co., Pfd	Oct. 1	1.75	875,000
Bingham & New Haven	Sept. 15	0.10	22,600
Bunker Hill & Sullivan	Sept. 6	0.60	180,000
Crucible Steel Pfd	Sept. 29	1.50	375,000
Daly West	Sept. 15	0.60	108,000
General Chemical, Pfd	Sept. 1	2.00	148,206
Homestake	Sept. 25	0.50	109.200
Horn Silver	Sept. 29	0.05	20,000
N. Y. & Hond. Ros	Sept. 22	0.30	45 000
Republic Iron & St., pfd	Oct. 1	3.75	765,634
Sloss. Sheff. Com	Oct. 1	2.50	187,500
Sloss Sheff. Pfd	Oct. 1	1.75	127,250
Va. Car. Chem. Pfd	Oct 15	2.00	360,000

Assessments.

Company.	Delinq.	Sale.	Amt.
Andes Silver Mg., Nev	Oct. 5	Oct. 26	$0.10
Black Diamond, Utah	Sept. 15	Oct. 6	0.01
Bullion G. & S., Nev	Oct 8	Oct. 31	0.05
Lower Mammoth Utah	Sept 15	Oct 4	0.05
Sierra Nevada, Nev	Sept. 12	Oct. 4	0.10
West Quincy, Utah	Sept. 7	Sept. 27	0.10

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	64.765	26.108	29.984
May	57.832	66.976	26.664	30.968
June	58.428	65.394	26.910	30.185
July	58.915	65.105	27.163	30.113
August	60.259	65.949	27.822	30.529
September	61.695	.....	28.528	.....
October	62.034	.....	28.637	.....
November	63.849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, 0.925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.419	68.262	78.896
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March	15.125	18.361	15.250	18.641	68.174	81.111
April	14.920	18.375	15.045	18 688	67.017	84.793
May	14.627	18.457	14.820	18.724	64.875	84.867
June	14.673	18.442	14.813	18.719	65.881	83.994
July	14.888	18.190	15.005	18.585	66.887	81.167
Aug	15.664	18.380	15.725	18.701	69.830	83.864
Sept	15.965	.....	15.978	.....	69.667	.....
Oct.	16.279	.....	16.332	.....	71.406	.....
Nov	16.599	.....	16.758	.....	74.727	.....
Dec.	18.328	.....	18.398	.....	78.993	.....
Year	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	29.325	36.390	July	31.760	37.275
Feb.	29.262	36.403	August	32.866	40.606
March	29.523	36.662	Sept	32.095	.....
April	30.525	38.900	Oct	32.481	.....
May	30.049	43.313	Nov	33.443	.....
June	30.329	59.260	Dec	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	4.552	5.600	July	4.524	5.750
Feb.	4.450	5.464	Aug.	4.665	5.750
March	4.470	5.350	Sept.	4.850	.....
April	4.500	5.404	Oct.	4.850	.....
May	4.500	5.685	Nov	5.200	.....
June	4.500	5.750	Dec.	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £16.850 per long ton; February, £16.031; March, £ 15.922; April, £15.959; May, £16.725; June, £16.813; July, £16.525; August, £17.109.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan	6.190	6.487	6.032	6.337	25.062	28.225
Feb	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April	5.817	6.078	5.667	5.931	23.813	25.781
May	5.434	5.997	5.284	5.846	23.594	27.000
June	5.190	6.096	5.040	5.948	23.875	27.728
July	5.396	6.006	5.247	5.856	23 938	26.800
Aug	5.706	6 027	5.556	5.878	24.675	26.938
Sept	5.887	.....	5.737	.....	26.375	.....
Oct.	6.087	.....	5.934	.....	28.225	.....
Nov	6.145	.....	5.984	.....	28.500	.....
Dec.	6.522	.....	6.374	.....	28.719	.....
Year.	5.822	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.